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ABSTRACT

The Advanced Technological Education (ATE) program promotes exemplary improvement in advanced technological education at the national and regional level through support of curriculum development and program improvement at the undergraduate and secondary school levels, especially for technicians being educated for the high performance workplace of advanced technologies. This book contains abstracts of awards for fiscal year 1995. The awards cover a wide range of advanced technological education fields including biotechnology, environmental technology, computer and information systems technology, chemical technology, manufacturing technology, electronics, geographic information systems technology, telecommunications, instrumentation and calibration technologies, and laser technology as well as mathematics, physics, biology, chemistry, and other core courses which serve such programs. Three indexes contain a listing of awards by state, a partial listing of World Wide Web Pages for FY 1995 Standard and Continuing ATE awards, and a list of principal investigators. (JRH)

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ADVANCED TECHNOLOGICAL EDUCATION PROGRAM

1995 AWARDS AND ACTIVITIES

ADVANCED TECHNOLOGICAL EDUCATION

U.S. DEPARTMENT OF EDUCATION
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ADVANCED TECHNOLOGICAL EDUCATION PROGRAM

1995 AWARDS AND ACTIVITIES

ADVANCED TECHNOLOGICAL EDUCATION

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
Division of Undergraduate Education
Division of Elementary, Secondary, and Informal Education

NATIONAL SCIENCE FOUNDATION

Division of Undergraduate Education

Division of Elementary, Secondary, and Informal Education

The Advanced Technological Education (ATE) Program

FY1995 Awards

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ADVANCED TECHNOLOGICAL EDUCATION (ATE)

The ATE program promotes exemplary improvement in advanced technological education at the national and regional level through support of curriculum development and program improvement at the undergraduate and secondary school levels, especially for technicians being educated for the high performance workplace of advanced technologies. *Curriculum development* encompasses the design and implementation of new curricula, courses, laboratories, and instructional materials. *Program improvement* encompasses faculty and teacher development, student academic support, and formal cooperative arrangements among institutions and other partners. ATE projects and Centers result in major improvements in advanced technological education, serve as models for other institutions, assure that students acquire strong backgrounds in mathematics and science, and yield nationally-applicable educational products. All projects and Centers have a vision for technician education which is used to guide project development. The ATE program is managed jointly by the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary, and Informal Education (ESIE).

LEADERSHIP AND DEVELOPMENT ACTIVITIES

In its second year of operation, many development and outreach activities occurred in the ATE program. NSF has made significant efforts to involve all interested parties in the continuing development of the program: two-year colleges, four-year colleges and universities, secondary schools, industry, and other government agencies. The focus has been on developing partnerships among several levels with two-year colleges in leadership roles. Activities included:

- *ATE Leadership Workshop* held in cooperation with the American Association of Community Colleges (AACC) and involving education leaders from two- and four-year colleges, universities, and secondary schools; leaders from industry with interest in technical education; and representatives from professional societies.
- *ATE Principal Investigator's (PIs) Conference* held in cooperation with AACC and involving the 3 FY 1994 ATE Centers, the 16 ATE planning grants for Centers, and approximately 6 of the large curriculum development projects. The conference was designed to help ATE award recipients begin to consider applications of the programs beyond the parameters of their own projects and to consider how the entire ATE program can impact and improve the Nation's technological education.
- *Eight ATE Outreach Workshops* sponsored by DUE and ESIE and attended by many administrators and faculty members.
- *Participation in Professional Society Meetings* by DUE and ESIE program directors.
- A number of workshops and several notable NSF publications, including:
  - February, 1995: publication of the ***Advanced Technological Education: 1994 Awards and Activities*** (NSF 95-6).
  - February, 1995: ***Partnering to Build a Quality Workforce: Critical Issues in Environmental Technician Education*** sponsored with the Advanced Technological Environmental Education Center. Report published August, 1995.
  - March, 1995: publication of ***Technical Education in 2-Year Colleges.***

- March, 1995: publication of ***Putting the Pieces Together, A Guidebook for Leaders of Coalitions of Two- and Four-Year Colleges and Universities***.
- April, 1995: publication of ***Activities in Support of Two-Year College Science, Engineering, Technology, and Mathematics Education: Fiscal Year 1994 Highlights*** (NSF 95-74).
- April, 1995: Observance of first NSF Community College Day.
- May, 1995: Planning meeting held for the workshop to define a national agenda for the ***Future of Engineering Technician Education in Two-Year Colleges***; workshop jointly sponsored by NSF, Accreditation Board for Engineering and Technology (ABET), American Society for Engineering Education (ASEE), and Sinclair Community College in October 1995.
- May, 1995: Initiation of regular column on NSF in the **AACC Community College Times**.
- June, 1995: Community College Presidents' meeting at NSF
- July, 1995: Planning meeting at NSF for a 1996 conference on International Technician Education.
- July, 1995: Participation of Program Directors from DUE in the Technology Reinvestment Program/Manufacturing Education and Training (TRP/MET) Grantees PI Conference.

PROGRAM SUPPORT

The ATE program is supporting projects in (a) instructional materials and curriculum development; (b) laboratory development and enhancement; and (c) faculty and teacher enhancement and preparation as well as six Centers of Excellence in Advanced Technological Education.

The awards cover a wide range of advanced technological education fields including biotechnology, environmental technology, computer and information systems technology, chemical technology, manufacturing technology, electronics, geographic information systems technology, telecommunications, instrumentation and calibration technologies, and laser technology as well as mathematics, physics, biology, chemistry, and other core courses which serve such programs.

In FY 1995, the ATE program initiated support of three new Centers of Excellence in Advanced Technological Education. These are:

- *The New Jersey Center for Advanced Technological Education* led by Middlesex County College (NJ) is creating a new associate degree program in engineering technology to meet the demand for multifunctional engineering technicians. This new program, being developed by 4 community colleges and 2 four-year colleges, is derived from combining mechanical, computer, telecommunications, and electronics technical programs. It begins in Grade 11, continues through the associate degree, and articulates with baccalaureate programs at New Jersey Institute of Technology for engineering technology programs and with Trenton State College's program in technology education to prepare secondary teachers of tomorrow.

- *The Northwest Center for Sustainable Resources* led by Chemeketa Community College (OR) is a collaborative effort of secondary schools, community colleges, four-year institutions, industry, government agencies, Native American tribes, and international research groups. Associate's degree natural resource technology programs are incorporating higher levels of mathematics and science, and are using an ecosystems approach that emphasizes sustainable methods of resource utilization. Program graduates enter employment as advanced technicians in a variety of science-based occupations including forestry, fisheries, environmental restoration, and Geographical Information Systems (GIS), or continue for baccalaureate and other advanced degrees.

- Bellevue Community College (WA), in collaboration with other community colleges, secondary schools, four-year institutions, industry, and government, is leading a new *Northwest Center for Emerging Technologies* to respond to industry's need for well-trained technicians in information technology. This Center, with strong input from industry, is developing articulation standards and model associate degree programs particularly for information science and its application to other disciplines (fields). Microsoft and Boeing, as well as many small-to-medium-sized Seattle-area companies, are active partners in the Center, providing both personnel as well as financial resources.

The three new Centers join the following three Centers originally funded in FY 1994:

- The *National Center of Excellence for Advanced Manufacturing Education*, housed on the campus of Sinclair Community College (OH), is a joint effort of Sinclair Community College, the University of Dayton, numerous local industries, and secondary schools. The Center significantly involves community colleges in three other states in the initial stage of materials development, with further involvement planned in beta-testing stages. The Center is acting as a catalyst to improve science, mathematics, and advanced manufacturing instruction by developing an advanced manufacturing curriculum beginning in Grade 11, continuing through the associate degree program, and culminating in a bachelor's degree. This project also includes writing, pilot testing, and publishing curriculum materials, as well as national dissemination of the model program, its curriculum, and instructional materials.

- The *Advanced Technological Environmental Education Center* is a joint effort of Eastern Iowa Community College (IA), Kirkwood Community College, Hazardous Materials Training and Research Institute (HMTRI), and Partners for Environmental Technology Education (PETE). This Center involves over 500 community colleges in their dissemination efforts. It is developing nationally-validated curriculum models and instructional materials; establishing comprehensive programs of professional development; serving as a clearinghouse for environmental education information; and providing a hub for networking of environmental educators with leaders in business and industry, federal agencies, and professional societies.

- The *Southwest Regional Center for Advanced Technological Education,* led by Texas State Technical Institute, Sweetwater (TX), involves many institutions in Texas, New Mexico, and Oklahoma. The project is developing the infrastructure and pedagogy to deliver technical courses in geographically widely separated colleges through distance learning. These include existing courses in CAD/CAM/CIM as well as new associate programs in polymer technology and electro-mechanical technology to complement needs of local industry.

In FY 1995, the ATE program began support of 36 new projects. For example:

* Seminole Community College (FL) is developing a new and innovative curriculum for introductory college physics. The course targets students in technology courses while maintaining the rigor that makes it transferable to four-year colleges and universities. It emphasizes a hands-on approach and motivates students to see connections between physics and their chosen fields.

* Wentworth Institute of Technology (MA) is creating, through joint efforts of mathematics and technical faculty, laboratory investigations using engineering laboratories and multimedia simulations that illustrate and teach mathematical concepts.

* Prince George's Community College (MD) is leading a consortium of 12 community colleges, each linked to a NASA Center, in conducting faculty enhancement workshops in remote sensing, image processing, and geographic information systems. The consortium is also developing an Earth Systems science course and interdisciplinary modules which can be infused into science and technology courses.

* Johns Hopkins University (MD) is leading a consortium which represents 5 different community college consortia (including over 130 community colleges directly) in developing instructional modules in science, mathematics, manufacturing technology, and technical communications to infuse into courses that comprise a broadly accepted, portable associate degree in manufacturing. Curriculum materials are based on the competencies in the report by the Labor Department entitled *Secretary's Commission on Achieving Necessary Skills* (SCANS). The five consortia involved represent two state systems (California and New Hampshire), two industry systems (Boeing and AT&T), and one professional society (Consortium for Manufacturing Competitiveness).

* Texas State Technical Institute - Waco (TX) is leading a multi-state effort to develop curricula and laboratory materials for student learning in advanced technologies for 15 occupational areas supporting American machining and machine tool industries. Key goals of the project include providing multi-skilled graduates, producing upgraded and new educational materials, working closely with college and industrial partners to validate competencies and materials, and preparing a national model for apprenticeships and internships.

* The *South Carolina Advanced Technological Education Exemplary Faculty Project* (SC), led by Piedmont Technical College, is bringing together the 16 community colleges in the South Carolina system for intensive professional development activities. In addition, curriculum reform in engineering technology is being developed, pilot tested, implemented, and evaluated

across the state. Partners also include Clemson University, the South Carolina Department of Education, and businesses and industries across the state.

- The University of Texas in Austin has a summer program for high school students with high potential for careers as technicians. The program emphasizes advanced technology, design, and applications. Computer-aided design projects are integrated into other components, and field trips to major industries give students opportunities to learn what technicians do.

In addition to the specific ATE projects listed above, the ATE program also co-funded several projects with other programs. For example:

- For the four Chemistry Initiative awards, the ATE program contributed funds to assure that curricula developed through those projects are tested in and adapted for appropriate programs such as those that prepare chemical, environmental, or biomedical technicians.

- The ATE program contributed funds to the Biological Sciences Curriculum Study project which was primarily supported through the Course and Curriculum Development (CCD) program. This curriculum, which is being developed primarily for two-year college biology classes, is being class-tested and adapted for use in technical programs benefitting biotechnology and environmental science.

Other special projects supported through the ATE program include:

- The development of the report by the American Mathematical Association of Two-Year Colleges (AMATYC) entitled **Crossroads in Mathematics: *Standards for College Mathematics Below the Level of Calculus*** was supported partially by ATE and CCD. This set of standards, released in early September, 1995, was developed with leadership from the two-year college community; however, members of the writing team also included four-year college and university faculty and members of the National Committee of Teachers of Mathematics (NCTM). It is being supported by all major mathematical societies. The ultimate goal of the project is to improve mathematics education and to encourage more students to study mathematics.

- Several national workshops being held to address important facets of technician education are being supported by ATE, including: *Critical Issues in Environmental Education* (February, 1995), *National Agenda for the Future of Engineering Technician Education* (October, 1995), the *Community College Science Connection Conference* (addressing articulation issues among two- and four-year institutions, April, 1996), and *Ethics and Biotechnology* (January, 1996).

- The American Association of Physics Teachers (AAPT) is establishing a network of physics faculty in two-year colleges which consists of 15 regional organizations, coordinated and linked by a national steering committee. The purpose is to help improve learning opportunities for students in two-year colleges, including those who transfer, those who become technicians in the high-technology workplace, and all students for whom physics serves as part of their college education.

AWARD STATISTICS

For FY 1995 a total of $23.25 M was awarded for ATE activities Since the total funds were divided between DUE and ESIE in the ratio of 2:1, approximately $15.5 M was provided by DUE and $7.75 M was provided by ESIE. As can be seen in Table I, the out-year commitment in the ATE program for FY 1996 is about $11.85 million and for FY 1997 about $5.45 million. These are the out-year commitments for the new centers and projects funded in 1995 and the continuing projects and centers funded in 1994.

TABLE 1
Award Statistics for ATE for FY 1995 (Dollars in Millions)

Type	Number	FY 95	FY 96	FY 97	Total
Centers New	3	$2.99	$2.88	$2.90	$8.77
Projects New	36	9.82	2.50	1.77	14.09
Centers Cont.	3	2.59	2.56	-	5.15
Project Cont.	12	4.40	3.08	-	7.48
Special	9	1.00	.46	.36	1.82
Other Programs	17	1.05	.37	.42	1.94
Leadership Actv.		1.40			1.40
Totals	80	$23.25	$11.85	$5.45	$40.65

As summarized in Table 1, ATE partially or fully supported 17 projects submitted to other programs which directly benefited technician education. These included three Course and Curriculum Development projects, two Undergraduate Faculty Enhancement projects, four Chemistry Initiative projects, two Instrumentation and Laboratory Improvement projects, three Mathematics and Their Applications Across the Disciplines projects, one Instructional Materials Development project, one Research Project, and one Young Scholars Project.

In FY 1995, 39 of the 115 proposals submitted were funded, for a funding rate of 34%. These new awards went to institutions in 25 States plus the District of Columbia. Including those ATE projects continuing in FY 1995, those co-funded with other projects, and the new awards, ATE projects are currently being supported in 33 States plus the District of Columbia.

Table 2 shows the distribution of active awards in FY 1995 (new 1995 awards and those continuing from 1994) by the type of technology.

TABLE 2
Award Distribution by Focus Area*

	Continuing	New
Science Technologies including Biotechnology, Chemical Technology, Computer Technology, and Environmental Technology	13	13
Engineering Technologies including Manufacturing, Electronics, Aerospace Technology, GIS, Civil, Telecommunications, etc.	10	23
Core Courses including Mathematics, Physics, Technology Education, Multi/Interdisciplinary	8	4
Total Awards	31	40

*Does not include Special Projects or ATE Contributions to other Programs

PROGRAM IMPACT

The projected national impact of the ATE program is large, especially that of the current six Centers and large curriculum and faculty enhancement awards. The Northwest Center for Emerging Technologies at Bellevue Community College (WA) estimates that, over a 5-year period, it will affect over 5,000 ATE college students, 350 ATE faculty and high school teachers, and 2,700 high school students. The Advanced Technological Environmental Education Center in the Eastern Iowa Community College District collaborates with Partners for Environmental Technology Education (PETE) to involve over 500 community colleges in their dissemination efforts. In the first 3 years of the award, the project will directly impact 300 community college teachers, 300 pre-college teachers, and 5,500 students. As an indirect effect, each of the 600 teachers is expected to teach an average of 100 students per year in environmental programs or literacy programs, yielding a projected impact of approximately 60,000 students during the award period.

The largest projects are faculty enhancement activities or curriculum development projects which plan to develop and test curriculum nation-wide. For example, the Miami University Middletown (OH) project plans to benefit 600 college faculty and pre-college teachers in faculty enhancement workshops and 20 in curriculum development efforts. Assuming each teacher or faculty member directly impacts 100 chemistry or chemical technician students per year, this will result in 60,000 students ultimately being impacted by the project. Activities include curriculum and instructional materials development, faculty and teacher enhancement, and student enhancement and outreach. An industrial internship program for high school and college teachers is also an important component of this project.

PROGRAM ISSUES

As work becomes more interdisciplinary and team-oriented, technical education must find a way to educate students more broadly in both science, mathematics, engineering, and technology (SMET) and general workplace competencies. The improved articulation of curricula and classroom experiences in advanced technological education between secondary schools and two-year colleges and between two- and four-year colleges and universities is an important goal of the ATE program. Additionally, ATE projects seek to enhance career opportunities for graduates of two-year science and engineering technician programs, as well as to ensure that teachers and faculty in fields which are undergoing rapid technological transformation are current in these fields. Some additional issues include:

- The exponential growth in the use of complex technologies requires that workers be technologically literate, competent, and well-grounded in mathematics and science. Students must be prepared to not only enter the workplace with relevant skills, but also to possess the flexibility to retool and adapt these skills as new technologies emerge.
- While industry and business ask for technological workers with good general mathematics and science training, they often hire those with specific workplace skills and experiences.
- The associate degree should become a credential in science and engineering technology fields and should be recognized as such by industry.
- Many undergraduates educated in SMET courses become technicians, yet SMET education has often ignored the needs of students making such career choices.
- It remains vitally important to attract talented young people from diverse backgrounds to careers as technicians.
- The demands of the modern workplace are changing so rapidly that continuing education is needed for workers to stay abreast of their jobs and to prepare for career change. A related concern is assuring ATE-supported projects remain current in the face of rapidly changing industrial needs.
- Programs must ensure that technicians graduating from ATE-funded projects possess the higher level skills needed to help industry compete in the international arena.

FUTURE PLANS

The ATE program has initiated several activities for this coming year and beyond.

- It is anticipated that the ATE program will make awards for up to five new Centers of Excellence in Advanced Technological Education and multiple projects to expand and diversify the impact of the program.

- The ATE program will continue to co-fund proposals submitted to other programs. This will help assure that many institutions consider education of the future workforce, including those who will work as technicians, an important component of their projects.
- Special projects that address important issues related to technician education will continue to be supported.
- More industry involvement in the ATE program is being sought.
- Appropriate active participation of four-year colleges and universities in ATE issues including project leadership, materials development, quality assurance, faculty and teacher development, and articulation is being promoted.
- The ATE program will more actively seek projects focusing on preparation of the future secondary school teachers and two-year college faculty who teach in these fields.
- Additional dissemination of products by publishers and other outlets such as electronic means, replication by other sites, and through workshops is being addressed.

New FY 1995 ATE Awards by Technology Area*

Type of Technology	Award Number	State	Type	Length in Years	First Year Award ATE	First Year Award Overall (in 1000s)	Total Award ATE	Total Award Overall (in 1000s)
BIOTECHNOLOGY								
Georgetown University	9553661	DC	PR	2	150	250	150	250
De Anza College	9553708	CA	PR	2	225	225	225	225
Hawkeye Community College	9553751	IA	PR	3	200	200	200	200
Nat'l Assoc. of Bio. Teachers	9553720	VA	PR	3	499	499	499	499
	subtotals				**1074**	**1174**	**1074**	**1174**
CHEMICAL TECHNOLOGY								
Southeast Community College	9553674	NE	PR	2	191	191	191	191
Michigan Technological University	9553671	MI	PR	3	500	500	500	500
	subtotals				**691**	**691**	**691**	**691**
COMPUTER AND INFORMATION TECHNOLOGY								
Los Rios CC System	9553717	CA	PR	2	50	50	50	50
Bellevue Community College	9553727	WA	CE	3	1000	1000	2992	2992
	subtotals				**1050**	**1050**	**3042**	**3042**
ELECTRONICS								
Indiana Univ. - Bloomington	9553694	IN	PR	3	300	300	300	300
North Seattle Community College	9553726	WA	PR	3	300	300	600	600
New Engl. Brd. of Higher Ed.	9553762	MA	PR	3	365	365	365	365
Front Range Community College	9553685	CO	PR	3	301	301	301	301
	subtotals				**1266**	**1266**	**1566**	**1566**
ENGINEERING TECHNOLOGY								
University of Georgia	9553676	GA	PR	2	98	98	98	98
Piedmont Technical College	9553740	SC	PR	3	474	474	1444	1444
Rose-Hulman Institute of Technology	9553705	IN	PR	3	475	475	475	475
Texas St. Tech. Institute - Harlingen	9553741	TX	PR	1	100	100	100	100
Middlesex County College	9553749	NJ	CE	3	786	986	2566	2766
CUNY/NYC Technical College	9553738	NY	PR	1	156	156	156	156
Prince George's Community College	9455105	MD	PR	1	39	39	39	39
	subtotals				**2128**	**2128**	**4878**	**5078**
ENVIRONMENTAL TECHNOLOGY								
University of Alaska SE Juneau	9553680	AK	PR	3	250	250	600	600
Trident Technical College	9553696	SC	PR	2	250	250	250	250
Stark Technical College	9553768	OH	PR	3	516	516	516	516
Chemeketa Community College	9553760	OR	CE	3	997	1000	2997	3000
Kansas State University - Salina	9553753	KS	PR	1	75	75	75	75
	subtotals				**2088**	**2091**	**4438**	**4441**

* Does not include Special Projects or ATE contributions to other programs.

Type of Technology	Award Number	State	Type	Length in Years	First Year Award ATE	First Year Award Overall (in 1000s)	Total Award ATE	Total Award Overall (in 1000s)
GEOGRAPHICAL INFORMATION SYSTEMS								
Prince George's Community College	9553662	MD	PR	3	314	314	694	694
Indiana State University	9553694	IN	PR	3	300	300	300	300
	subtotals				**614**	**614**	**994**	**994**
MANUFACTURING								
Johns Hopkins University	9553664	MD	PR	3	500	500	1300	1300
Northern Illinois University	9553687	IL	PR	1	214	214	214	214
Wayne State University	9553692	MI	PR	2	150	150	150	150
Regional Technology Strategies, Inc.	9553698	NC	PR	1	79	79	79	79
Rio Grande Center for Manufacturing	9553701	TX	PR	2	100	100	100	100
Colorado Cmty. College System	9553706	CO	PR	2	181	181	298	298
Texas St. Tech. Institute - Waco	9553716	TX	PR	3	550	550	1550	1550
Madison Area Technical College	9553684	WI	PR	1	155	155	155	155
NC State Brd. of Cmty. Colleges	9553709	NC	PR	2	120	120	120	120
Keene State College	9553767	NH	PR	3	250	250	548	548
	subtotals				**2299**	**2299**	**4514**	**4514**
MATHEMATICS								
Wentworth Institute of Technology	9553704	MA	PR	3	547	547	547	547
SUNY Adirondack Cmty. College	9553765	NY	PR	2	185	185	234	234
	subtotals				**732**	**732**	**781**	**781**
PHYSICS								
Seminole Community College	9553665	FL	PR	3	429	429	429	429
Austin Community College	9553689	TX	PR	2	319	319	319	319
	subtotals				**748**	**748**	**748**	**748**
(All amounts are in 1000's)	**Grand Total**				**12690**	**12793**	**22726**	**23029**

Key: **PR**= Project, **CE**= Center, **ATE**= Advanced Technological Education

1994 Awards Continuing into 1995 by Technology Area*

Type of Technology	Award Number	State	Type	Length in Years	ATE	Total Award Overall (in 1000s)
BIOTECHNOLOGY						
California State University Foundation	9454502	CA	PR	3	250	250
Peralta Community College District Office	9454657	CA	PR	3	209	209
Middlesex Community College	9454642	MA	PR	3	1132	1132
Madison Area Technical College	9454555	WI	PR	2	1000	1000
	subtotals				**2591**	**2591**
CHEMICAL TECHNOLOGY						
American Chemical Society (ACS)	9454564	DC	PR	3	1500	1500
Alvin Community College	9454508	TX	PR	2	247	247
Miami University Middletown	9454518	OH	PR	3	1200	1200
	subtotals				**2947**	**2947**
COMPUTER INFORMATION TECHNOLOGY						
Univ. of Hawaii/Maui Community College	9454647	HI	PR	3	499	499
Center for Image Processing in Education	9454520	AZ	PR	3	1347	1347
MN Riverland Tech. College (Austin)	9454551	MN	PR	2	500	500
	subtotals				**2346**	**2346**
CORE AND ONE OR MORE SPECIFIC TECHNOLOGIES						
Texas St. Technical Institute - Sweetwater	9454551	TX	CE	3	1612	1680
Amarillo College	9454651	TX	PR	3	630	630
West Valley College	9454513	CA	PR	3	300	300
	subtotals				**2542**	**2610**
ELECTRONICS						
Portland Community College	9454589	OR	PR	2	200	200
CUNY Queensborough Community College	9454613	NY	PR	3	500	500
	subtotals				**700**	**700**
ENGINEERING TECHNOLOGY						
Piedmont Technical College	9454536	SC	PR	2	123	123
	subtotals				**123**	**123**
ENVIRONMENTAL TECHNOLOGY						
Eastern Iowa Community College District	9454638	IA	CE	3	2999	2999
Intelecom Intelligent Telecommunications	9454521	CA	PR	3	1500	1500
Mesa State College	9454633	CO	PR	3	400	400
	subtotals				**4899**	**4899**

* Does not include Special Projects or ATE contributions to other programs.

Type of Technology	Award Number	State	Type	Length in Years	Total Award ATE	Total Award Overall (in 1000s)
GEOGRAPHICAL INFORMATION SYSTEMS						
Kansas State University - Salina	9454618	KS	PR	3	500	500
	subtotals				**500**	**500**
MANUFACTURING						
Sinclair Community College	9454571	OH	CE	3	3000	3000
Houston Community College	9454569	TX	PR	2	604	604
Minuteman Sci. & Tech. High School	9453921	MA	PR	3	185	356
Wytheville Community College	9454577	VA	PR	2	197	197
Pennsylvania State University	9454547	PA	PR	2	658	658
Consortium for Adv. Man. Intntl. (CAM-I)	9454655	TX	PR	3	1500	1500
	subtotals				**6144**	**6315**
MATHEMATICS						
Mt. Hood Community College	9454627	OR	PR	3	469	469
Middlesex County College	9454604	NJ	PR	2	169	169
Kentucky Community College System	9454585	KY	PR	3	696	800
	subtotals				**1334**	**1438**
PHYSICS						
Concord Consortium	9454575	MA	PR	3	432	432
Henry Ford Community College	9454620	MI	PR	2	129	129
	subtotals				**561**	**561**
(All amounts are in 1000's)	**Grand Total**				**24687**	**25030**

Key: **PR**= Project, **CE**= Center, **ATE**= Advanced Technological Education

Centers of Excellence

New 1995 Awards

Title: Northwest Center for Emerging Technologies: New Designs for Advanced Information Technology Education

Neil Evans
Bellevue Community College
3000 Landerholm Circle SE
Bellevue, WA 98009

DUE 9553727
FY 1995 $999,737
FY 1996 $992,386
FY 1997 $999,931
Computer and Information Technology

The Northwest Center for Emerging Technologies (NWCET) recognizes that technologists in emerging industries must be independent, creative problem solvers. The pace of technological change increasingly requires that such workers have a strong fundamental education in math and science together with interpersonal communication and critical thinking skills. NWCET is developing national certification models for strengthening Information Technology (IT) education through its focus on seven objectives:

- New Partnerships. Development of the Regional Advanced Technology Education Consortium (RATEC), representing high schools, two- and four-year colleges, businesses and governmental agencies, to respond to the education needs of technological industry. Major partners include NSF, Boeing, Microsoft, US West and the State of Washington.

- New Degree Structures. Development of new Associate and Baccalaureate of Advanced Technology degrees providing a seamless path from high school to two- and four-year college programs, and to employment. This process includes the first national standards for IT job categories and degree curricula.

- New Curricula. Development of an innovative interdisciplinary core curriculum and specialized technical curricula for IT. Both curricula are developed in close collaboration with industry and organized around real-world, team-based problem solving skills and integrated with internships and other workplace experience.

- Student Success. Development of a comprehensive approach to recruitment and retention of students in technical programs, monitoring and assessing their progress, job placement and career advancement. Special attention is paid to the needs of traditionally underrepresented populations.

- Electronic Courseware. Development of multimedia and other electronic courseware to support both the core and specialized technical curricula.

- Professional Development. Faculty-Industry Fellowships and other opportunities for high school and college teachers coordinated with continuing education of practicing technologists.

- Evaluation & Dissemination. Program evaluation by the Northwest Regional Educational Laboratory and the NWCET National Advisory Board. Modes of dissemination include regional and national conferences, electronic publishing and Internet consultancy through the NWCET WWW home page, video documentaries and teleconferences, and commercial print and CD-ROM publication.

Title: New Jersey Center for Advanced Technological Education

John Bakum
Middlesex County College
155 Mill Road
Edison, NJ 08818

DUE 9553749
FY 1995 ATE $ 785,997
(TOTAL $ 985,997)
FY 1996 $ 982,931
FY 1997 $ 997,544
Engineering Technology

"Mecomtronics" describes a new program in engineering technology being created to meet the demand for a multifunctional engineering technician. "Mecomtronics" is derived from **ME**chanical/**COM**puter/ tele**COM**munications/ elec**TRONICS** which identify the functional areas. To accomplish this, the New Jersey Center for Advanced Technological Education (NJACTE), through its member institutions is restructuring engineering technology education beginning in grade eleven, continuing through the associate degree, and articulating with the baccalaureate programs. During each of the three years of this project, work is being done on interrelated curriculum, instructional materials development, faculty and teacher enhancement, and student outreach. The Advanced Technological Education Center is located at Middlesex County College in New Jersey. Other academic institutions which are members of the consortium include: Essex County College (ECC), Mercer Community College (MCC), County College of Morris (CCM), Raritan Valley Com-

munity College (RVCC), the New Jersey Institute of Technology (NJIT), and Trenton State College (TSC). Each component of Center effort is being coordinated by a member institution: the curriculum development component by Middlesex County College; faculty development by CCM; the Student Outreach by ECC; articulation of high school associate degree and baccalaureate collaboration by TSC; strengthening partnerships with business and industry by NJIT; the NJCATE communications clearinghouse by MCC; and, social, environmental and ethical issues by RVCC. An articulation agreement between the Mecomtronics program and Trenton State's baccalaureate program in technology education is helping to prepare secondary school teachers of tomorrow.

Title: Northwest Center for Sustainable Resources (A National Center for Advanced Technology)

Wynn W. Cudmore
Chemeketa Community College
4000 Lancaster Drive, NE
P.O. Box 14007
Salem, OR 97309

DUE 9553760
FY 1995 ATE$ 996,663
(TOTAL $ 999,663)
FY 1996 $ 999,553
FY 1997 $ 999,227
Environmental Technology

The Northwest Center for Sustainable Resources (NCSR) is a collaborative effort of partners from Washington, Oregon, and northern California to create a national Advanced Technology Center of Excellence. The goal of the Center, coordinated from Chemeketa Community College, Salem, OR, is to enhance natural resources technology education programs at community colleges and secondary schools. Programs are expanding current math and science core requirements, particularly through the development of an environmental science core curriculum. As a nucleus for programmatic change, principles of environmental sciences emphasize an ecosystems approach to natural resources technology education. The Center's technician programs are producing graduates who can contribute to a workforce supporting sustainability in natural resources management. Employers in the Pacific Northwest and the nation from both private sectors and government agencies require employees with a broader understanding of biological and physical sciences, advanced skills in data collection and analysis, and abilities to utilize cutting-edge tools such as Geographical Information Systems and other computer-aided technologies. These technicians are being increasingly sought by employers, and the NCSR is catalyzing programmatic changes necessary to meet these needs. Faculty and student internships bring real-world experiences to the programs. The project is accomplishing the following objectives:

1. Development and enhancement of natural resources curricula in forestry, fisheries, wildlife, agriculture, and other natural resources-based fields in a collaborative effort of community colleges and partners in the three-state region; dissemination of products produced by this project nationally and internationally.

2. Creation of a world-class electronic network to serve as an information exchange site for NCSR partners and others, as well as a national clearing house for scientific information supporting natural resources technologies developed by researchers and educators.

3. Connection of NCSR programs with programs leading to bachelors and advanced degrees to produce "seamless delivery" of natural resources programs, improving articulation between all levels of education.

The NCSR is providing the leadership to enable NCSR partners to develop frameworks for advanced technological education, share innovative teaching methods, incorporate new technologies into existing programs, and serve as a repository and dissemination site for emerging information in environmental sciences and natural resources management.

Centers of Excellence

Continuing Awards

Title: Advanced Technology Environmental Education Center - (ATEEC)

Ellen Kabat
Eastern Iowa Community College District
500 Belmont Road
Betterdorf, IA 52722

DUE 9454638
FY 1994 $ 999,961
FY 1995 $ 999,907
FY 1996 $ 999,998
Environmental Technology

The Advanced Technology Environmental Education Center (ATEEC), which is a joint effort of Eastern Iowa Community College, Kirkwood Community College, Hazardous Materials Training and Research Institute (HMTRI), the Partnership for Environmental Technology Education (PETE), and the University of Northern Iowa, involves over 500 community colleges in their dissemination efforts. The Center is developing nationally validated curriculum models and instructional materials; establishing comprehensive programs of professional development; serving as a clearinghouse for environmental education information; and acting as a hub for the networking of environmental educators, business and industry, federal agencies, and professional societies.

The Center is providing leadership to: enhance core and advanced mathematics and science and technology components of environmental education; utilize advanced electronic communications networks; focus upon meeting the needs of diverse learners; encourage instructional materials which utilize advanced technologies; and develop teaching and curriculum standards for environmental education. ATEEC is enhancing hundreds of faculty and teachers and improving the education of thousands of students throughout the nation.

Title: National Center of Excellence for Advanced Manufacturing Education (NCE/AME)

David T. Harrison
Sinclair Community College
444 West Third Street
Dayton, OH 45402

DUE 9454571
FY 1994 $ 1,000,000
FY 1995 $ 1,000,000
FY 1996 $ 1,000,000
Manufacturing

The Advanced Integrated Manufacturing Center is a joint effort of Sinclair Community College and the University of Dayton to create a National Center of Excellence for Advanced Manufacturing Education (NCE/AME). The goal of the Advanced Integrated Manufacturing Center, located on the campus of Sinclair Community College, is to redesign the infrastructure of technological education in manufacturing. The NCE/AME is a catalyst for educational change to improve science, mathematics, and advanced manufacturing instruction at secondary school, community college, and university levels. The program is accomplishing the following objectives:

1. Developing a new competency-based, occupationally verified, seamless curriculum beginning in grade 11, through the Associate of Applied Science degree, culminating with the Bachelor of Science degree using advanced manufacturing as the focus, with gateways to and from industry employment throughout.
2. Writing, pilot testing, and publishing curriculum materials (laboratory manuals, video, software, and other ancillary materials) to improve mathematics, science, and manufacturing engineering technology instruction.
3. Disseminating the curriculum, instructional materials, and model program nationally.

Title: Southwest Regional Center for Advanced Technological Education

Robert L. Musgrove
Texas State Technical
Institute - Sweetwater
300 College Drive
Sweetwater, TX 79556

DUE 9454551
FY 1994 $ 565,872
ATE : $ 465,872
ILI : $ 100,000
FY 1995 $ 585,290
FY 1996 $ 560,475
Core and One or More
Specific Technologies

The Southwest Regional Center for Advanced Technological Education is a collaboration among two-year colleges, four-year colleges and universities, industries, and Tech-Prep consortia in West Central Texas, New Mexico, and Oklahoma to provide technical education in a vast rural region through distance education. The project is developing the infrastructure and the pedagogy to deliver many technical courses through distance learning. These include existing courses in CAD/CAM/CIM which are being converted for delivery via distance learning to two-year institutions and secondary school sites. Faculty at two-year colleges are working with the Department of Education at Texas Technical College to develop new instructional materials. In particular, the Center is developing new AAS programs in polymer technology and electro-mechanical technology to complement needs of industry in the area.

Through an intensive effort at developing distance education and electronic networking in the consortium, the Center is enabling the member institutions to share their substantial resources, to deliver quality instruction throughout the area, and to exchange data and information rapidly and efficiently. This "center without walls" addresses the intertwined problems—distance, expense, and limited resources—inherent in delivering advanced technological education in such a large region. Its findings, strategies, tactics, materials, and methodologies constitute a significant contribution to technical education in the nation.

PROJECTS

New 1995 Awards

Title: Preparation of Technicians for the Biotechnology Industry

Jack G. Chirikjian
Georgetown University
3900 Reservoir Road NW
Washington, DC 20007

DUE 9553661
FY 1995 ATE $ 150,000
(TOTAL $ 250,000)
Biotechnology

This project is focusing on (a) bringing together a coalition of educators, scientists, industrial partners, and curriculum developers to establish a strategy for the Tech/Prep Associate Degree technician preparation program; (b) developing a preliminary curriculum to provide hands-on enhancement opportunities for college faculty and preservice teachers in the area of biotechnology; and (c) recruiting two-year college faculty to test the curriculum materials in summer workshops. At the beginning of the project, this coalition is meeting to determine the most effective strategy to initiate and address project goals and objectives.

The program is having both a direct and an indirect effect on preservice teachers in the area of biotechnology that includes: (a) two-year and four-year college faculty who are directly incorporating the curriculum in their instruction, (b) the availability of materials that make it possible to incorporate the biotechnology curriculum into teacher education programs; and (c) participants on the Steering Committee and Advisory Board who are integrating these materials in their preservice education programs.

Title: Remote Sensing, Image Processing, and Geographic Information Systems

Patricia A. Cunniff
Prince George's
Community College
301 Largo Road
Largo, MD 20772

DUE 9553662
FY 1995 $ 313,973
FY 1996 $ 293,427
FY 1997 $ 87,541
Geographical Information Systems

Community Colleges for Innovative Technology Transfer, Inc. (CCITT), a consortium of 12 community colleges across the United States all linked with a local NASA Center, is conducting six faculty development workshops (two each) in remote sensing, image processing, and geographic information systems (GIS). An Earth Systems science course with a self-standing laboratory utilizing remote sensing, image processing, and geographic information systems is being developed as well as an interdisciplinary curriculum module having multiple strands which utilize the technologies above. The interdisciplinary modules can be infused into science and technology courses at CCITT institutions and other community colleges throughout the United States.

Community college members of CCITT include: Brevard Community College, FL; Cuyahoga Community College, OH; Foothill-De Anza Community College District, CA; John C. Calhoun Community College, AL; Pasadena City College, CA; Pearl River Community College, MS; Prince George's Community College, MD; Thomas Nelson Community College, VA; and the Houston, TX-based Consortium for Aeronautical Technical Education composed of San Jacinto Community College, College of the Mainland, Alvin College, and Lee College.

NASA Headquarters and local NASA Centers are supporting the faculty development/curriculum work. The remote sensing workshops are being held at NASA Goddard Space Flight Center in Greenbelt, MD, with a portion of the instruction being provided by NASA scientists and engineers. Scientists from NASA/AMES are involved with the two image processing workshops to be held at Foothill College. Individuals from academe and industry with GIS experience are supporting the two GIS workshops.

Title: Associate Degree for Manufacturing Technicians

Arnold H. Packer
Johns Hopkins University
Charles and 34th Street
Baltimore, MD 21218

DUE 9553664
FY 1995 $ 499,967
FY 1996 $ 400,000
FY 1997 $ 399,867
Manufacturing

This project is developing six instructional modules in science, mathematics, manufacturing technology, and technical communication which can be infused into four courses and thereby assist in the creation of the foundation for a broadly accepted portable associate degree in manufacturing. Modules are being created around 8 of the 22 generic standards developed by a national panel of educators and employers in 1994. The standards are based primarily on the competencies defined by the Secretary's

Commission on Achieving Necessary Skills (SCANS). Multidisciplinary teams of mathematics, science, and technology faculty are designing a series of CD-ROMs and print materials for the instructional modules. The materials are being produced by the Educational Film Center. The design teams come from 5 Lead Colleges representing 5 consortia of community colleges, which include over 130 colleges. The Lead Colleges are implementing the revised curricula and disseminating the results to consortia members. Two consortia are state systems—California and New Hampshire, two are industry-based—Boeing and the Alliance of AT&T and its union, the last is the Consortium for Manufacturing Competitiveness. Affiliate Colleges also implement the instructional modules. National boards, which include representatives of the American Association of Community Colleges, the National Association of Manufacturers, the five consortia, industry, and related community college efforts, are guiding the design and implementation of activities and helping disseminate the results to community colleges and employers across the nation. A formative and summative evaluation is being undertaken by the American Institute for Research.

Title: Introductory College Physics 2000-ICP/2

Alexander K. Dickison
Seminole Community College
Highway 1792
Sanford, FL 32771

DUE 9553665
FY 1995 $ 429,521
Physics

This project is developing a new and innovative curriculum for introductory college physics to be known as Introductory College Physics 2000 (ICP/2). This algebra-based course is modular since its genesis is the Principle of Technology Modules developed in the 1970s. ICP/2 is being made available in hard copy, but IBM and MAC versions on CD-ROM are emphasized since they allow the instructor using the material to edit it before printing for classroom use. The new curriculum incorporates what is now known, through studies in cognitive science, about teaching strategies that improve student learning. The modules are being developed to introduce activities designed to enhance a student's conceptual understanding and ability to make connections to related ideas.

Introductory College Physics 2000 targets students in technology courses, although it is suitable for all college students. With the introduction of Tech-Prep and similar programs, more technology students are taking college physics. Each module in the new curriculum uses modern technological devices to introduce physics concepts. This motivates technological students and helps them see the connections between physics and their chosen fields. This college physics course maintains a rigor that makes it highly transferable to universities. It emphasizes a hands on approach and introduces all major concepts of introductory physics. However, it is the philosophy of ICP/2 that it is more important for students to fully understand fewer basic concepts and have confidence in applying them to new situations than it is for them to be exposed to more ideas that are neither understood nor remembered. Project ICP/2 involves consultants and two other community colleges in Washington and Pennsylvania. During the first year, advisory boards and other writing centers are being formed.

Title: Chemical Engineering Technology Advanced Process Operations Program

Edward R. Fisher
Michigan Technological University
Department of Chemical Engineering
1400 Townsend Drive
Houghton, MI 49931

DUE 9553671
FY 1995 $499,996
Chemical Technology

This 3-year project is developing an innovative two-year degree program in Chemical Engineering Technology: Advanced Process Operation. The project draws upon a strong partnership among Dow Corning Corporation, Dow Chemical Company, Delta Community College, and Michigan Technological University. The degree program consists of a first-year program taught at Delta Community College where high school articulation agreements and diversity outreach initiatives are well established. Due to proximity, work internships are available with industrial partners. Upon successful completion of this first-year experience based on academic performance and work related recommendations, students transfer to the second-year academic program at Michigan Tech. The second year stresses engineering technology with a strong laboratory component leading to a capstone experience in the new multipurpose pilot plant facilities of the Process Simulation and Control Center. Cooperative and apprentice experiences are available during the second year.

The Partnership enables the development and implementation of a model program to lead to highly trained process operators who are comfortable with new process technologies, regulations which shape these industries, and safety and teamwork skills which are adaptive to the changing high performance workplace of the future.

Title: A Chemical Technology Curriculum and Materials Development Project

John V. Kenkel
Southeast Community College
8800 O Street
Lincoln, NE 68520-1227

DUE 9553674
FY 1995 $ 191,590
Chemical Technology

Southeast Community College, in partnership with the University of Nebraska at Lincoln, is directing a curriculum and materials development project for the first-year chemistry course in two-year college chemical technology programs. The specific objectives of the project are to create: (1) a national model for the introductory chemistry portion of the curriculum; and (2) materials that can be used with the model curriculum that will be published and widely disseminated. The model and written materials are utilizing industrial examples and the new voluntary industry standards (VIS) with the goal of developing a mindset in students that prepares them for their chosen careers. With this background, students are also better prepared for their second-year courses in analytical chemistry, organic chemistry, and biochemistry which build on this base. In addition, consideration is being given to transferability to four-year colleges and universities.

Written materials are being produced as the project unfolds. These materials initially take the form of modules representing individual subject areas. The authors are using industrial process/topics to introduce and support each subject area and are deriving basic chemical principles from the processes described. Such a theme-based or "story line" approach is unique, but effective, in creating the desired mindset. The project is examining the newly developed VIS and incorporating those that are relevant to the subject matter presented. The modules when completed, are being published in the form of a textbook. Prototype CD-ROMs are being produced to accompany some of the modules with the intent of supporting and reinforcing the subject matter. Field-testing is taking place at Southeast Community College, University of Nebraska at Lincoln, and Athens State Technical Institute in Georgia. Further dissemination and voluntary field-testing is taking place via a network of colleges formed as part of an earlier grant.

The principal investigators are approaching the tasks with the thought that further reforms of the chemical technology curriculum (i.e., the second academic year) and the production of additional CD-ROM materials will take place as part of future projects.

Title: Using Multimedia Technology to Enhance Electronics Engineering Technology Programs

Dorothy J. Harnish
University of Georgia
104 Industrial Arts Building
Athens, GA 30602

DUE 9553676
FY 1995 $ 97,975
Engineering Technology

The project is a collaborative effort of six technical institutes, a public land grant university, a state department of technical and adult education, and industry representatives to develop applications for multimedia and distance learning technologies in Electronics Engineering Technology associate degree programs in Georgia. The project is focusing on faculty development activities. Twenty-four technology faculty are being trained in multimedia applications. This is being accomplished through a series of 3-day workshops in multimedia development, held at Augusta Technical Institute. Materials developed by individual faculty in these workshops are being shared among the 24 faculty in the 6 technical Institutes to expand the impact of this training activity. In addition, six faculty members are receiving advanced training in the creation of multimedia applications. Evaluation and sharing of multimedia materials and applications in instruction are being facilitated through two follow-up meetings of all project faculty later in the year.

Title: Rural Alaskan Environmental Education Program

Gary L. Bowen
University of Alaska SE Juneau
1322 Seward Avenue
Juneau, AK 99801

DUE 9553680
FY 1995 $ 250,000
FY 1996 $ 250,000
FY 1997 $ 100,000
Environmental Technology

The University of Alaska Southeast (UAS) is developing and implementing the Rural Alaskan Environmental Education Program. The project is establishing a centralized educational center at the UAS Sitka Campus, as well as a system for dissemination of curriculum to teachers and students in remote villages throughout the state. The program is modeled on the recommendations of the Federal Field Working Group on Rural Alaska Sanitation Problems and represents a cooperative effort of secondary/postsecondary educators, native leaders, and those State and Federal agencies responsible for environmental programs in the State of Alaska. The program addresses

a critical public health need, throughout Alaska and other rural settings, for environmental scientists and sanitation technicians. It is designed to establish cultural awareness of the link between the environment and public health, engaging village youth as agents of change.

The program is providing a cross-disciplinary curriculum in an articulated 2+2 tech-prep format for grades 11-14. Curriculum components encompass an academic core (math, written and oral communications, social science), laboratory science (chemistry, microbiology, geology, climate), and systems technology (hydraulics, mechanics, electronics).

Students are completing a systematic program leading from a secondary diploma to a postsecondary associate degree, along with field experience necessary to achieve technician certification under Alaska regulations for operation of water and wastewater treatment, distribution, and collection systems. An academic and career counseling program, based on professional mentoring and service learning, is assuring that students completing the program are prepared both for transfer to baccalaureate degree programs and for transition into the workforce in rural Alaska.

Title: Advanced Dimensional Metrology and ISO 9001 Educational Partnership Program

Robert L. Brown
Madison Area Technical College
Dept. of Engineering Technology
211 North Carroll Street
Madison, WI 53703

DUE 9553684
FY 1995 $ 155,036
Manufacturing

This project is providing employees, skilled in metrology and ISO 9001, to the engineering, manufacturing, and service industries. To achieve this goal, a collaboration is being established between the Machine Tool Program at Madison Area Technical College, the suppliers and users of precision measuring, the University of Wisconsin Center for Quality and Productivity Improvement, the Madison Metropolitan School District, and the Wisconsin School-To-Work Initiatives, as well as articulation with other secondary and postsecondary educational institutions and professional organizations. This project is a well-coordinated, highly integrated effort to: 1) develop and disseminate curriculum materials specifically designed for technical training at the two-year associate degree level; 2) provide teacher enhancement activities in advanced dimensional metrology and ISO 9001 that include summer institutes, mentoring, and curriculum development partnerships for associate degree and secondary school teachers.

Title: Electronics Technology Curriculum Development

Brenda L. Bryan
Front Range Community College
3645 West 112th Avenue
Westminster, CO 80030

DUE 9553685
FY 1995 $ 301,783
Electronics

In this project, interdisciplinary curriculum development teams are designing, developing, and implementing a flexible and modular electronics curriculum. This curriculum integrates academic and cutting-edge technical skills with innovative instructional technology to produce job skills for industry. The curriculum focuses initially on DC Fundamentals and AC Fundamentals with beginning work in Solid State Fundamentals and Digital Fundamentals. The project is combining the resources of Front Range Community College, Colorado State University School of Occupational and Educational Studies, and local secondary institutions. Innovative, competency-based instructional modules that utilize a combination of task-oriented and student-oriented methods are being designed. Multi-media techniques are supporting both consistency and flexibility of instruction and delivery. Results, techniques, and modules are being shared through publications and conference presentations.

Title: Development and Field Test of a Supplementary Welding Lab on Disk for Teachers and Students

Xueshu Song
Northern Illinois University
203 Still Hall
DeKalb, IL 60115

DUE 9553687
FY 1995 $ 213,851
Manufacturing

This project is developing a sophisticated interactive computer simulation software package to supplement and complement hands-on welding laboratory experiences for welding technology students. The project integrates the development of instructional media, teacher enhancement, and instrumentation and laboratory improvement via a coalition of Northern Illinois University and Rock Valley College, a two-year college in the northern Illinois region. The goals of the project are to enhance students' understanding of the interdisciplinary nature of advanced welding technology; to minimize laboratory-related costs, hazards, and environmental pollution; to motivate teachers via application of computer simulation and research participation; and to attract women and minorities into advanced technology programs. Preliminary development and research findings, documented by recent publications by the principal investigator, have shown that the software to be developed results in good engineering econ-

omy and high pedagogic effectiveness. An advisory and evaluation board of outside experts are providing additional expertise and experience. The project complements future research and development activities leading to *Advanced Technology Labs on Disk.*

Title: Foundation Skills for Advanced Technology

Stephen B. Rodi
Austin Community College
1212 Rio Grande Street
Austin, TX 78701

DUE 9553689
FY 1995 $ 318,715
Physics

This project is producing and field-testing instructional materials intended to develop foundational skills for careers in advanced technology. The course is aimed at 11th and 12th grade students but is applicable to other student populations as well. The course focuses on topics and skills in mathematics, physics, and engineering. It emphasizes understanding of ideas and the natural interplay of mathematics, physics, and engineering in solving problems. It intends to provide an alternative to the routine, rote, and worksheet-driven curriculum which sometimes characterizes beginning instruction for students interested in technological careers. The course is built around 10 problems, each problem associated with an instructional module. Students work in cohorts of four to solve problems. Each problem requires students to use instruments, collect data, understand the mathematics and physics related to the problem, and write up and present solutions in a group setting. Mathematics and physics is taught as a seamless whole related to real problems in a setting in which, it is hoped, students see group effort as the most effective route to success. The course may be an alternate or re-entry path back to the regular science curriculum or may lead to advanced degrees in science and engineering technology. Faculty and teacher development activities are an important component of the project.

Title: The Southeastern Michigan Alliance for Reinvestment in Technological Education (SMARTE) Project

Mulchand S. Rathod
Wayne State University
Department of Engineering Technology
Detroit, MI 48202

DUE 9553692
FY 1995 $ 149,900
Manufacturing

Seven community colleges are part of SMARTE (Southeastern Michigan Alliance for Reinvestment in Technological Education) as well as K-12 school systems, a major state university, community-based organizations, government agencies, labor, business, and industry interests in southeastern Michigan.

The goals of the project include:

1. Development of a SCANS based model for a manufacturing program, which maps the standards in each of three disciplines: product design, industrial controls, and manufacturing. Specific tasks to be accomplished are to: identify skill standards which relate to engineering technologies, organize workshops to review skill standards, create model competencies, study professional organization certification procedures, and provide access to the information on curriculum and certification via WWW SMARTE aliases.

2. Establishment of pilot enrichment programs for students who are beginning preparation for coursework in the technologies as early as elementary school grades. This results in holding at least one 2-week intensified summer institute for local public school students, and at least two workshops at community college sites to encourage elementary and middle school students, primarily minorities and females, into technology fields.

3. Development of a curriculum in product design, which is being shared with faculty and teachers of the consortium through a hands-on workshop.

Title: Advancing Geo-Technology Education: Providing GIS Remote Skills for the Workforce of the Twenty-First Century

William A. Dando
Indiana State University
217 North 6th Street
Terre Haute, IN 47809

DUE 9553694
FY 1995 $ 300,000
Geographical Information Systems

The Department of Geography and Geology of Indiana State University is introducing 25 community college instructors to the principles of Geographic Information Systems (GIS), one of the fastest growing employment fields in the 1990s. Designed to promote the adoption of GIS as an integral part of numerous technically oriented instructional programs in two-year colleges, this model program is taking the needed first step in supplying the workforce in the Midwest with technicians educated in the use of this rapidly growing technology. Working in teams of two or three community college instructors from the same institution, participants are acquiring the basic principles of GIS in two 3-week summer institutes and in one continuing education class. They are learning the

many ways in which this technology is used today in business, government, and industry. The immediate aim of this project is to give participants sufficient familiarity with GIS principles and knowledge of software and its utility so that they can return to their campuses with enough expertise to begin to incorporate this technology into existing courses. The long-term aim envisions participants establishing discrete GIS education programs at their institutions. To ensure realization of project goals, consultants from two-year colleges with successful GIS programs are advising in organizing all institution programs. They are also part of the summer institutes' teaching teams. A two-year college faculty member is serving as project evaluator.

Close cooperation of the Robinson, IL, campus of Illinois Eastern Community College and the Terre Haute campus of Indiana Vocational Technical Institute is assured in two ways: (1) faculty teams from these two institutions are receiving GIS instruction in the summer institutes; and (2) these institutions are being provided with hardware and software to help facilitate employment of GIS into their existing courses. Development of introductory courses in GIS and integration of GIS into existing courses at these two institutions are among the primary aims of the project.

Title: Integrating New Visions in Environmental Sciences and Technology (INVEST)

Catherine Almquist
Trident Technical College
Department of Physical Sciences
P.O. Box 10367
Charleston, SC 29411

DUE 9553696
FY 1995 $250,647
Environmental Technology

This 2-year project encompasses curriculum development, faculty enhancement, and instrumentation and laboratory improvement. Curriculum activities include development of: (1) a curriculum for a course in X-Ray Fluorescence Analysis of Lead Based Paint and Building Materials; (2) stand-alone laboratory experiments in analysis of lead in drinking water, GIS applications in environmental assessment and remediation, and gas chromatography/mass spectrometer sugar analysis identification of viable airborne organisms; and (3) environmental application for integration into math, science, and technology courses. Opportunities for faculty enhancement are being provided through internships with industrial partners, as well as participation in conferences and workshops. A curriculum work group, composed of project partners, is facilitating a comprehensive approach to materials development and sharing of expertise. A 1-week faculty training institute is being held in the second year of the project to disseminate course materials and train instructors in advanced technologies. A variety of activities designed to increase career awareness in secondary and post secondary minority student populations are planned for both years of the project.

Title: New Technologies, Techniques and Technical Skills in the Manufacturing Economy: Reinventing Community Colleges

Stuart A. Rosenfeld
Regional Technology Strategies, Inc.
Chapel Hill, NC 27514

DUE 9553698
FY 1995 $ 79,500
Manufacturing

Regional Technology Strategies, Inc., in partnership with the American Association of Community Colleges, the National Association of Manufacturers, and the Southern Growth Policies Board, is designing, supporting, and implementing two major symposia (one in the South and the other in the Northeast) that focus on how two-year educational institutions can better meet the needs of modern, high value, high performance manufacturers. The symposia are intended (1) to inform education and training policy makers about changes and opportunities in technical occupations in advanced manufacturing, (2) to deepen understanding of the emerging industrial modernization system, (3) to identify obstacles and opportunities to improve performance, and (4) to develop a clear vision of how to make the needed improvements. Attendees include presidents of member colleges; chancellors of state systems; and directors of state modernization programs, school-to-work transition programs, and economic development agencies. Each chancellor is being asked to submit names of others (e.g., presidents, legislators, board members) to be invited from their states.

The host organization in the South is the Consortium for Manufacturing Competitiveness, a group of leading technical colleges started and incubated by the Governors and legislators of the southern states. In the Northeast, a new alliance of college systems is hosting the symposium. The objective of each symposium is to accelerate and support industrial modernization with improved technical education and services that build demand for small and medium-sized manufacturers to better utilize technical skills.

Title: Interdisciplinary Courses in Electronics Manufacturing

Elaine M. Cooney
Indiana University - Bloomington
799 West Michigan Street
Bloomington, IN 47402

DUE 9553699
FY 1995 $ 297,475
Electronics

This project is leading to the development of interdisciplinary courses for electronics manufacturing education that provide highly trained technicians to U.S. industry. A wide range of activities that include all three subcategories of ATE Projects are necessary to meet this goal. Associate degree faculty expertise is being enhanced with industry fellowships, workshops, and seminars. With better understanding of industry needs, these faculty, along with a practicing engineer from the Electronic Manufacturing Productivity Facility (EMPF), are developing three new courses that are the basis for a new degree option. The laboratories which accompany these courses use facilities belonging to industry partners, the EMPF, and the schools, along with equipment purchased under the Instrumentation and Laboratory Improvement section of this grant. Additional activities, centering around the Mobile Electronics Manufacturing Line and the EMPF, link secondary teachers and students with associate degree faculty, practicing engineers, and technicians. Such activities facilitate secondary teacher enhancement and curriculum development.

Title: Regional Center of Excellence for Precision Manufacturing Technologies

Wayne Wells
Rio Grande Center for Manufacturing
Director's Office
1201 West University Drive
Edinburg, TX 78539

DUE 9553701
FY 1995 $100,340
Manufacturing

Precision manufacturing, particularly tool, die and precision machining and related manufacturing technologies, including plastics molding and metal stamping are an important segment of the Rio Grande Valley regional economy and the national economy. A new model educational program is being developed to create skilled workers who can participate in workplace teams in concurrent engineering. The model is based on the historical guild. Master technologists and students work side-by-side performing productive work in a learning environment. A consortium of other colleges and local industries is being created.

Title: Mathematics for Technology - Laboratory Investigations

Gary M. Simundza
Wentworth Institute of Technology
550 Huntington Avenue
Boston, MA 02115

DUE 9553704
FY 1995 $ 499,951
Implementation Award
DUE 9455996
FY 1995 $46,804
Planning Project
Mathematics

Mathematics faculty at Wentworth Institute of Technology have been employing active learning strategies, characteristic of the calculus reform movement, at all levels of mathematics courses for students of engineering technology since 1989. This student population is motivated primarily by perceived relevance of subject matter to specific technical problems.

The project is developing, through joint efforts of mathematics and technical faculty, laboratory investigations using engineering laboratories and multimedia simulations that illustrate and teach mathematical concepts. The project begins at the intermediate algebra/trigonometry level and continues through precalculus. Fifty sections per year, containing 1500 students, are being affected at Wentworth. Through an existing network of Tech-Prep consortia, Wentworth is taking the lead in extending the secondary level integrated curriculum reforms of Tech-Prep to the college level. Collaboration among faculty from Wentworth and neighboring colleges and secondary schools involved in Tech-Prep, as well as selected industry personnel, is resulting in a series of workshops and minicourses to disseminate materials and methods developed at Wentworth to mathematics teachers at New England area institutions, affecting a potential 25,000 Tech-Prep students.

The Wentworth project serves as a national model for colleges of engineering technology in integrating the learning of mathematics with technical applications. Through the American Society for Engineering Education (ASEE) and the American Mathematical Association of Two-Year Colleges (AMATYC), a potential 100,000 additional students may ultimately be affected.

Title: Problem-Based Learning: A Key to Enhanced Performance in Advanced Technological Education

Buck F. Brown
Rose-Hulman Institute of Technology
Department of Electrical Engineering
5500 Wabash Avenue
Terre Haute, IN 47803

DUE 9553705
FY 1995 $ 475,000
Engineering Technology

Education in the United States is at a pivotal juncture. U.S. citizens must compete in a demanding global society, but our educational systems are struggling with outdated approaches and stagnant budgets. The knowledge explosion of the past 20 to 30 years has provided advanced technological education with a singularly difficult challenge. The traditional answer to this knowledge explosion has been to pack more essential facts into the curricula. Careful consideration of this issue suggests that an information-laden society requires resourceful skills, insights, and abilities; hence, educational innovation must focus less on facts and more on problem solving and inquiry-based learning. The Wabash Valley Educational Alliance is implementing an important educational vision and establishing a permanent cooperative effort within the Wabash Valley (west central Indiana). This project addresses instructional methods that impact the education of students of technology, science, mathematics, and engineering in two year, associate degree granting institutions. It is affecting educational approaches at all levels of technology; producing new curricula materials including problems and examples; providing a living video series of applications; and creating a national, refereed, electronic database for sharing problem-based materials and experiences. Problem-based instruction concentrates learning around real-world problems similar to those encountered by practitioners in the field. In problem-based learning, the teacher's role changes quite dramatically from that in a traditional learning situation. The teacher must guide the students in the problem-solving process, directing them through questioning techniques. Problem-based learning helps students become critical thinkers and problem solvers. There is significant potential for its further refinement and widespread application to advanced technological education. This potential, if fully developed, can place technological education in a leadership role and heighten its visibility among the professions.

Title: Rocky Mountain Advanced Technology Education Project

Don E. Goodwin
Colorado Community College System
9125 East 10th Drive, Building 859
Aurora, CO 80010

DUE 9553706
FY 1995 $181,170
FY 1996 $117,294
Manufacturing

In recognition of the importance of metrology in advanced manufacturing and to the future of the United State's economy, the Colorado Community College and Occupational Education System (CCCOES) is undertaking the Metrology Curriculum Development Project which involves curricula development, laboratory development, faculty in-service, and professional development for regional and national dissemination. This program is being developed at the Community College of Aurora, which is improving and modernizing its existing Associate of Applied Science Degree in Metrology/Precision Measurement program offered at the Higher Education Advanced Technology Center (HEAT Center). The project team is seeking input and direction from its Advisory Council from the National Institute of Standards and Technology (NIST) and the National Conference of Standards Laboratories (NCSL), as well as from industry.

The specific outcomes of the Metrology Curriculum Development Project include pedagogical strategies that will reconceptualize metrology education nationwide. The project provides opportunities to enrich a variety of curriculum in advanced technology education by incorporating the following elements:

1. the use and integration of distance learning in the instructional strategy;
2. an effective articulation model;
3. development of national standards for metrology education in cooperation with NIST and NCSL;
4. a model for a professional advisory council associated with metrology; and
5. development of an Information CD for direct distribution, as well as dissemination on INTERNET.

Title: Advanced Biotechnology Education Project

Shahla Sheikholeslam
De Anza College
21250 Stevens Creek Boulevard
Cupertino, CA 95014

DUE 9553708
FY 1995 $ 225,306
Biotechnology

The project is developing an advanced biotechnology education program that can serve as a satellite model program for other community colleges in California and the nation. The fundamental objective is to advance and broaden students' knowledge and hands-on experience in the area of biotechnology. The new laboratory instructional materials are fostering technical education and are helping students gain marketable skills for the workforce.

Title: Collaborative Model for Technician Education Through Interactive Technology

J. Parker Chesson
North Carolina State Board of Community Colleges
200 West Jones Street
Raleigh, NC 27603

DUE 9553709
FY 1995 $ 120,000
Manufacturing

The North Carolina Community College System is developing a program focused at the 11th and 12th grade levels and at the community college level for engineering technology students preparing to enter the manufacturing workforce. The underlying precept of the project is that workers at all levels of manufacturing must formulate and derive solutions to problems. These workers must enter the workplace with competence in numerical methods including statistics, probability, rate of change, and conversions, as well as being able to use computers, networks, and other sophisticated mathematical tools and information technology to solve problems. Students are being taught the same powerful problem-solving strategies that are used in the manufacturing industry, and are solving these problems by developing critical thinking skills and using multimedia and interactive technology in networked collaborative learning environments. Students learn to develop solutions to real problems in a high technology virtual workplace classroom. Through partnerships with industry, universities, community colleges, and high schools, new models of faculty enhancement and instructional materials development are being used.

Colleges of Education at universities, in cooperation with the manufacturing industry and non-profit technology institutions, in North Carolina are providing both in-service and pre-service professional development and technical support to high school and community college faculty. In this new model for technician education, the classroom is becoming a virtual workplace for students to gain experience and confidence in solving real problems facing engineering technicians in manufacturing, and to share experiences on problem-solving strategies used in manufacturing.

Title: Machine Tool Advanced Skills Technology Educational Resources (MASTER) Program

John D. Pierson
Texas State Technical Institute - Waco
3801 Campus Drive
Waco, TX 76705

DUE 9553716
FY 1995 $ 550,000
FY 1996 $ 500,000
FY 1997 $ 500,000
Manufacturing

This project is a multi-state effort to develop curricula and laboratory materials for student learning in advanced skills technologies for 15 occupational areas supporting the American machining and machine tool industries. The Machine Tool Advanced Skills Technology Educational Resources (MASTER) Program is designing, developing, testing and disseminating new curricula materials for AS/AAS degree options in machining and metals related technologies. Since these occupational areas generally require some form of apprenticeship or internship, these educational materials are also designed and prescribed for use with industry partners. The problems addressed by this project are: (1) the use of outdated curricula materials by schools and colleges; (2) fewer students entering programs of study in these career fields that are highly important to the nation's economy in aerospace, metals, and manufacturing; (3) the rapid evolution of new multi-task machine tools that have reached beyond the capabilities of many existing technicians; and (4) the lack of rigorous college level programs that are needed to prepare a target audience of knowledge based workers in advanced problem solving skills. Five key goals are being addressed by the MASTER Program: (1) to provide more technical graduates that are multi-skilled in new machining tools and support related technologies; (2) to upgrade curricula and laboratories in these technical fields which are critical to the success of our nation; (3) to offer college-level training to existing industry employees to become multi-skilled with new and highly advanced equipment; (4) to establish realistic opportunities for college and industrial partners to validate competency requirements, and prepare a national model for apprenticeship/internship with prescribed laboratory work experiences; and (5) to disseminate the new curricula and educational materials nationally. This collaborative effort brings together six of the nation's leading two-year colleges, geographically dispersed, in areas of high demand, with identified public

school and industry partners. Significant potential national outcomes include the survival of many critical industries and technical jobs.

Title: Theme Curriculum: An Integrated Curriculum Development Project In Support of Advanced Technology Education

Dave Sinclair
Los Rios Community College System
Department of Design Technology
4700 College Oak Drive
Sacramento, CA 95825

DUE 9553717
FY 1995 $ 50,000
Computer and Information Technology

The purpose of this project is the development of an integrated curriculum project in support of advanced technology education. Initially, the project serves students in Design Technology, Engineering Technology, and Engineering from American River College. Later, as a model, it will serve students from the entire community college district and potentially the state.

The Core of the program is theme curriculum. Theme curriculum is a product, and its interrelationship with business and community is being developed through a cohesive two year technical program. Its goal is to develop an integrated and diverse connection allowing individuals educational flexibility through exposure to application. It is simulating the actual community of people, business, community planning, product design, manufacturing, and testing. To complement this core theme, the curriculum includes situations that simulate the workplace within a professional studio environment.

Theme curriculum exposes students to the expectations and standards required by business and industry. A student completing this program will have diversity in technical knowledge and skills to function effectively in any business or be able to act as an entrepreneur. Theme curriculum cycles every 2 years, thereby exposing incoming students to the entire process. A model is being developed and implemented that can be used at secondary schools to encourage students to enter a technical career. 2+2+2 articulated programs are being developed to allow students opportunities to obtain an advanced technical education or obtain skills so they can work. Theme curriculum encompasses the community concept and is diverse enough to teach mechanical, civil, electrical, and architectural disciplines. The curriculum is integrated with other campus programs and is a model for equity programs such as LINKS, Women in Technology and MESA/MEP. It also serves as a regional training model for high school teachers, engineering technology Tech-Prep instructors; and as retraining for displaced government and private industry workers. It provides all citizens the opportunity to obtain technical knowledge and skills to compete in the marketplace.

Title: High Quality Biotechnology Education

Kathleen Frame
National Association of Biology Teachers
11250 Roger Bacon Drive
Reston, VA 22090

DUE 9553720
FY 1995 $ 499,239
Biotechnology

The National Association of Biology Teachers (NABT) is conducting a project using the Life Technologies, Inc.(LTI): GIBCO BRL Training Center laboratories in Germantown, Maryland. Two-year college faculty in partnership with high school teachers from across the nation are being updated on cutting-edge biotechnological research and procedures. Teamed with scientists and technicians from industry, these teachers are developing an innovative educational model to rapidly adapt the advanced techniques and sophisticated equipment of modern biotechnology to inexpensive, hands-on, investigative classroom activities. These activities allow two-year college and secondary schools with limited budgets to provide future technicians and scientists with an excellent scientific background in the techniques and concepts of biotechnology. Additionally, strong articulation between two-year and high school programs and industry is being established to ensure that students pursuing careers in biotechnology have the ability to enter the industrial or research work environment as more than competent technicians, or to pursue higher degrees at four-year institutions. These activities seek to involve all students in learning biotechnology, including women, minorities, and persons with disabilities. Emphases are being placed on the role of biotechnology in the future of the human environment and medicine, and the effect of biotechnology on preservation of plant species and enrichment of agriculture.

Activities from this workshop are being refined, reviewed for scientific accuracy and pedagogy, and field-tested nationwide. Field-test results and review panel advice are being used to modify the activities for compilation into a monograph for nationwide distribution. Project results are being disseminated through training and in-service workshops at national, state, regional, and local levels.

Title: Advanced Technology Curriculum: Meeting AEA Standards

Andrew Woodson
North Seattle Community College
9600 College Way North
Seattle, WA 98103

DUE 9553726
FY 1995 $300,000
FY 1996 $300,000
Electronics

The aim of the project is to enhance pre-vocational and electronics and engineering technologies curricula. By collaborating with industry, professional associations, institutions of higher education, and secondary schools, the project is developing model programs that raise standards and performance levels for technicians in industrial applications. To comply with the new standards developed for technicians by the American Electronics Association (AEA) designed to raise skill and knowledge levels, the project is effecting significant changes in the approach to technological education. Spanning a period of 2 years, the project focuses on three major components:

(1) Faculty Development. A faculty enhancement program is planned to prepare faculty for curricular reform. Participants in summer institutes include electronics and engineering faculty, secondary school teachers, and representatives of industry. The institutes cover a range of topics that include AEA standards, industry practices, collaborative approaches to teaching, use of interactive courseware, and competency-based instruction.

(2) Curriculum and Institution Materials. Comprehensive curricular reform includes development of pre-college level workshops in communications; computers; developmental technical mathematics and algebra for students deficient in basic skills; applied academics; integration of science and mathematics into technical programs; and new and revised curricula in electronics and engineering technology. Modules focus on basic skills and on specific, typically complex technical topics such as object-oriented design and documentation.

(3) **Laboratory Improvement.** Over the two-year period, faculty are integrating into the curriculum a new learning laboratory where automated work environments can be simulated and state-of-the-art systems demonstrated. The integrated systems laboratory is designed to provide students with an overview of systems involved in taking a product from design and pattern layout to a tested and finished product.

Title: College/Industry Telecommunications Education Partnership

Charles W. Merideth
CUNY/NYC Technical College
300 Jay Street
Brooklyn, NY 11201

DUE 9553738
FY 1995 $156,000
Engineering Technology

New York Technical College/CUNY and NYNEX are collaborating to develop a telecommunications technology program that provides NYNEX employees the underpinnings in telecommunications fields while also acting as a prototype two-year degree program for all students. This initiative emerged from a shared vision that the development of an adaptive, technologically-agile, and customer-focused workforce is crucial to the development of NYNEX, now and into the next century. The mission of the project is for the two-year college to provide an innovative telecommunications program that enables employees to stay apace with advancing technology, to understand changing marketplace realities, and to develop customer service skills. This is done by working closely with industry to identify the workforce skills that is being needed 5 years in advance and then creating an associate degree program to deliver an educated, customer-accountable workforce that is committed to the value of life-long learning. The project includes a faculty enhancement component.

Title: The South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty Project

Lynn Mack
Piedmont Technical College
Department of Mathematics
Greenwood, SC 29648

DUE 9553740
FY 1995 $ 486,930
FY 1996 $ 487,297
FY 1997 $ 482,379

The South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty project is designed to restructure the learning environment to prepare two-year technical college students for the workplace. The project is creating a cadre of exemplary faculty teams for the express purpose of implementing innovative research-based advanced technological education practices across the SC Technical College System. The major objectives are to: (1) develop and implement a comprehensive Faculty Development Program for ATE that addresses

faculty development needs in advanced technology education content, effective pedagogy, and assessment of student learning outcomes; (2) develop, pilot test, and implement research-based curricular reform in advanced engineering technology programs; and (3) evaluate implementation processes and materials and disseminate successful processes and products at the local, state, and national levels. Methods include involving interdisciplinary faculty teams from the 16 SC technical colleges in intensive professional development activities. The primary audience is mathematics, physical science, engineering technology and communications faculty members. Collaborative partners include Clemson University and the National Dropout Prevention Center at Clemson, the SC State Department of Education (SSI and Tech-Prep Programs) SC ETV, the Academy for Educational Development, and the Virginia Community College System.

Title: Digital Imaging Laboratory Development Program

Bobby Hoyle
Texas State Technical Institute - Harlingen
Department of Information Management Technology
2424 Boxwood
Harlingen, TX 78550

DUE 9553741
FY 1995 $ 100,000
Engineering Technology

Texas State Technical Institute at Harlingen is developing a Digital Imaging Technology Program to improve specialized skills and training to students in the field of digital imaging technology. A digital imaging curriculum is being developed and a digital imaging laboratory/studio created to facilitate the use of non-traditional learning approaches that encourage interactive learning, team building, and creative problem-solving among students and teachers. There is an extensive collaborative effort involving eight secondary schools; the Tech-Prep/School to Work Initiative; and regional, state, and national industries. The main population to be served includes students in the Rio Grande Valley of Texas—a predominately Hispanic populated area.

Title: Development of a Two-Year Associate Degree in Agricultural Technology

Terry Brase
Hawkeye Community College
1501 East Orange Road
Waterloo, IA 50704

DUE 9553751
FY 1995 $ 200,000
Biotechnology

Hawkeye Community College is developing and distributing the curriculum for an associate degree in Agricultural and Food Technology. In the past 2 years rapid changes have occurred in technology in the field of food systems. Technology changes involving biotechnology, GPS/GIS satellites, and computer/telecommunication networks and other innovations will continue into the next century. For farmers to remain competitive in the food industry, they, and the food systems sales and service people supporting them, must be educated in this new technology. There are "fewer and larger farm operations, still individually owned and operated by families, but more business-like...And to be profitable, the farmer must use technology" (KSU AG REPORT, Fall 1994). Hawkeye Community College is planning and testing an innovative 64 credit hour curriculum which links the agricultural and business experience with technology. The curriculum and all support materials are being used in expanding articulation agreements with the secondary schools and four-year institutions including a land grant university interested in updating agricultural curriculum into food systems. The materials are being disseminated through national education associations, journals, and telecommunication systems.

Title: A National Two-Year Associate Degree Program in Environmental Technology

Stephen E. Swanson
Kansas State University - Salina
2409 Scanlan Avenue
Salina, KS 67401

DUE 9553753
FY 1995 $75,000
Environmental Technology

Kansas State University - Salina and a consortium of 10 community colleges are developing a plan for a student-centered environmental technology curriculum suitable

for national distribution. The utility of the project is to provide building blocks to allow for individual course development at the community colleges that adapt the curriculum. This enables the end users to customize their own particular curriculum. The team assembled is composed of content, pedagogy, and media specialists. A satellite and Internet based communications network is being established to enable instructors nationwide to keep in contact with each other and with content specialists, and to provide access to maintained databases for curriculum updates.

Title: Teacher/Faculty Enhancement, Curriculum Development and Laboratory Improvement for Fiber Optics Technology Education

Nicholas M. Massa
New England Board of Higher Education
45 Temple Place
Boston, Massachusetts 02111

DUE 9553762
FY 1995 $ 365,100
Electronics

This project is a faculty development activity which aims to provide training for college faculty and pre-college faculty members. A series of 2-day workshops, summer workshops, and technical assistance sessions is being conducted over a period of 30 months. The project is designed to increase the number of high school teachers and two-year college faculty who have the expertise to include fiber optics and related topics in their science/technology programs. Also, the project includes faculty enhancement, curriculum development, and laboratory improvement. There is a significant participation from industry.

Title: Development and Implementation of Advanced Applied Technological Mathematics

Alfred Patrick
SUNY Adirondack Community College
Bay Road
Queensbury, NY 12804

DUE 9553765
FY 1995 $ 184,880
FY 1997 $ 49,314
Mathematics

This 3-year project involves a community college, four area high schools, and local business and industry in developing and piloting an advanced mathematics course as a 4th- year offering to follow and extend a Tech-Prep applied mathematics sequence. This course is consistent with the New York State Framework and national guidelines from the National Council of Teachers of Mathematics and the American Mathematical Association of Two-Year Colleges. Specific attention is being devoted to student problem solving, critical thinking skills, concept attainment, motivation, and making connections in applied laboratory hands-on settings. The embedded use of calculators and computers is a major goal of this effort. The course materials are being disseminated in the Capitol Region Consortium and beyond. A publisher is anticipated for this course product.

Title: Defining the Emerging Role of the Technologist in a Computer-Aided-Engineering Environment

Robert W. Simoneau
Keene State College
229 Main Street
Keene, NH 03435

DUE 9553767
FY 1995 $250,000
FY 1996 $150,000
FY 1997 $148,260
Manufacturing

The Industrial Technology and Safety Program at Keene State College project is planning and implementing a revised curricula in its two-year associate degree program in Design and Manufacturing based on the emerging Computer Aided Engineering environment. Today graduates are entering an increasingly competitive job market. They need to have a readily marketable skill in order to compete for jobs or the academic proficiency to go on to obtain advanced degrees. The companies that hire graduates are facing enormous competitive pressure from around the world. The loss of our manufacturing base continues. The resulting job loss is a significant socio-economic and political problem. United State's companies need a flexible and technologically competent workforce in order to stem this tide. The emerging role of the technologist must be one that can fully utilize computer assisted technology. This computer environment is integrating the once discrete job functions of design, manufacturing, and business. The current limitations in existing discrete curricula suggests a new seamless educational paradigm. To address this situation, three areas of study need to be examined. The first is a conceptual-based curriculum, using a projects focus, to deliver technical problem solving for meeting curriculum goals. The second aspect is to create a series of four integrated courses in the area of product design and development, utilizing a computer assisted environment. The third is to establish a collaborative working on these projects on the Internet, with other schools, government laboratories, and companies. The curriculum model the project is creating is an immersion model for students that provides both a contextual and constructivist environment for problem solving. In this environment, students solve holistic and fully integrative problems in math, science, technology, and busi-

ness. This curriculum model emulates both the emerging computer assisted environment and the world of work. The goals are to create this new curriculum paradigm and study its effectiveness. The model is both pragmatic and realistic and serves as a nation model. This is one of many solutions being offered to help improve the competitive position of graduates. By breaking with traditional paradigms the project serves as a model to entice non-traditional and minority students, as well as displaced workers, to move into the exciting and challenging world of product design and development. The project also opens many new and exciting opportunity for educational research.

Title: Advanced Technological Education Project in Environmental Technology

Jeffrey Cramer
Stark Technical College
6200 Frank Avenue, NW
Canton, OH 44720

DUE 9553768
FY 1995 $516,209
Environmental Technology

Stark Technical College (STC) is developing an Advanced Technological Education project in Environmental Technology which is resulting in the development of an Environmental Technology option within Civil Engineering Technology. The project is addressing northeastern Ohio's business and industry needs for technical expertise in the environmental instrumentation, regulation and compliance areas, as well as waste minimization/pollution prevention concepts. This need is critical due to the heavy concentration of manufacturing in the region, and the fact that northeastern Ohio is the most polluted quadrant of the state. The College's established ties with business and industry in the region are facilitating the design of a program that is producing uniquely qualified graduates who help the public and private sectors address growing environmental regulations and concerns. The AAS degree curriculum is tied into secondary Tech-Prep programs in the region and related bachelor's degree programs at Youngstown State University and the University of Findlay. An integral part of the curriculum is advanced communications technologies which enable students (high school, two-year college and university) to communicate with each other on collaborative projects. It also serves as the basis for an Environmental Resource Center (ERC), to be operated by students, which facilitates and enhances instruction, as well as responds to business/industry and community questions and concerns. A major component of the project is the use of summer institutes and academic year follow-ups for teacher/faculty enhancement in several key areas: pedagogy; technical expertise; and math, science and communications-related instruction.

Title: Integrating Computer Software into Lower Division Engineering Technology Courses

William D. Lauffer
Prince George's
Community College
301 Largo Road
Largo, MD 20772

DUE 9455105
FY 1995 $39,269
Engineering Technology

Prince George's Community College, Largo, MD (PGCC) is holding a 5-day workshop in summer 1995 entitled Integrating Computer Software into Lower Division Engineering and Engineering Technology Courses. The workshop supports 20 faculty from engineering, engineering technology, and science who teach lower division courses in community colleges and senior institutions in the middle Atlantic states. The workshop include lecture/demonstration, visualization activities, and computer work with Math CAD, MicroCAP, LogicWorks, and PADS. Each participant brings three problems from three different courses to the workshop. These can be solved during the workshop and then be developed into a book of practice problems and solutions which will be given to each participant. Applications are shown to Statics, Dynamics, Strength of Materials, Thermodynamics, Electronics, and Physics Courses. Workshop participants are introduced to the Internet and its uses, and to the work of the NSF Engineering Coalition, Engineering Coalition of Schools for Excellence in Education and Leadership (ECSEL). Follow-up activities include the development by PGCC of a computer bulletin board to allow workshop faculty and other faculty in their home institutions to communicate and assist one another, presentations by workshop participants in their home institutions, and presentations and papers for professional meetings.

1994 Project Awards Continuing into 1995

Title: Math/Science Enhanced Manufacturing Technology Training for Females and Minorities

James Amara
Minuteman Science and Technology High School
758 Marrett Road
Lexington, MA 02173

ESIE 9453921
FY 1994 $ 185,700
FY 1996(ATE) $ 170,370
Manufacturing

A pilot manufacturing laboratory facility has been established at Minuteman Science and Technology High School. This formal 3-year curriculum in manufacturing technology is coordinating with Middlesex Community College.

This project is developing over a 4-year period, an integrated manufacturing institution model for 30 female and minority teachers grades 6-12. Participants are being introduced to the project via three seminars held in the spring. Seminars are on equity issues and manufacturing technology. Each summer over the life of the project, the participants receive an intensive 3-week workshop on current trends and practices in manufacturing. Topics include: automation, electronics, mechanics, and biomanufacturing. Emphasis is placed upon the integration of mathematics and science, the importance of communication and human relations, technology skills related to manufacturing, career awareness, and hands-on activities appropriate for junior and senior secondary school students. Each academic year, the original 30 teachers acquire more complex integrated mathematics/science and technology skills coupled with specific workshops on women and minority issues as they begin to develop integrated projects suited to their teaching environment. The project emphasizes a realistic view of science and technology and problem-solving activities which require skill in collaboration, experimentation, writing, computing, and the pursuit of exploration.

Title: Expanding the Biotechnology Education Program in the San Francisco/Oakland Bay Area

David R. Stronck
California State University Foundation
Department of Teacher Education
Hayward, CA 94542

DUE 9454502
FY 1994 $ 250,000
Biotechnology

A program for training biotechnology technicians is presently operating at Contra Costa Community College with articulation to Richmond Secondary School. A Tech-Prep grant funded internships at Contra Costra College and local biotechnology firms for secondary school students. This project is assisting science educators and scientists to continue preparing technicians for local biotechnology companies. For the 48 teachers involved, a 3-week workshop and 8 follow-up meetings during the academic year are being offered. Mentors make site visits. Telecommunications is being used to implement the program. A biotechnology kit and curriculum are being developed; implementation is planned into many secondary schools with high minority enrollments.

Title: Interactive Multimedia Instruction for Advanced Instrumentation Technology

Kenneth Sweeney
Alvin Community College
Department of Electronics
3110 Mustang Road
Alvin, TX 77511

DUE 9454508
FY 1994 $ 247,823
Chemical Technology

Interactive Multimedia Instruction (IMI) is known to be an effective method of delivering technical skill instruction to learners across many educational areas. This project merges the Instrument Society of America's

INVOLVE IMI system with the current Electronics program to provide a specialized Associate of Applied Science Instrumentation curriculum. The principal aims of the project are to increase the number of instrumentation career seekers, to build education pathways from secondary schools through four-year colleges and universities in partnership with industry, to educate a more culturally diverse and gender balanced work force, and to improve learning efficiency. The project is producing highly skilled individuals able to track the process control industry's transition into the evolving automated workplace of tomorrow.

Title: Pac-TEC: The Pacific Technological Education Center

Wade Ellis
West Valley Community College District
14000 Fruitvale Avenue
Saratoga, CA 95070

DUE 9454513
FY 1994 $ 300,000
Core and One or More Specific Technologies

Pac-TEC is a consortium of two-year colleges, secondary schools, and businesses situated in the Silicon Valley with regional partnerships in seven western states. This project is developing and distributing state-of-the-art instructional materials and techniques to secondary schools, colleges, industry, and government. These materials focus on innovative mathematics, science, engineering, and technology, and are aimed at students who are becoming technicians. Emphasis is being placed on the development of materials which enhance students' problem solving abilities, computer literacy, effective oral and written communication skills, and ability to work in groups. The materials are being created around open-ended, design-based project work.

Title: Partnership for the Advancement of Chemical Technology (PACT)

Arlyne M. Sarquis
Miami University Middletown
4200 East University Boulevard
Middletown, OH 45052

DUE 9454518
FY 1994 $ 400,000
FY 1995 $ 400,000
FY 1996 $ 400,000
Chemical Technology

Miami University Middletown, in partnership with the major chemical industries in Ohio and a regional consortium of two-year and four-year colleges and secondary schools, is establishing a regional consortium for Chemical Technology Education. By bringing academic courses into closer touch with today's industrial chemistry, the project is attracting additional students to careers in chemistry and improving the quality of education of chemical technicians.

Four categories of activities are envisioned for the project: (1) Curriculum Development; (2) Instructional Materials Development; (3) Faculty and Teacher Enhancement; and (4) Student Enhancement and Outreach. Secondary school and college faculty are eligible for a Teacher Industrial Internship Program in which participants spend a summer or part of an academic year working in partner industries. Similarly, master secondary school teachers and two-year college faculty are working in collaboration with industrial chemists in developing curriculum and instructional materials. Symposia and special topic seminars are also being organized on a regular basis.

The project is being built upon the nationally known, 8-year old Partners for Terrific Science industrial/academic partnership and programs housed in the Center for Chemical Education at Miami University Middletown, as well as upon existing collaborative efforts of other consortium members. This project is serving as a model for regional and national development of improved chemical technician education.

Title: Image Processing for Teaching: Faculty Development and Curriculum Materials

Melanie Magisos
Center for Image Processing in Education
5343 E. Pima Street, Suite 201
Tucson, AZ 85712

DUE 9454520
FY 1994 $403,814
FY 1995 $466,493
FY 1996 $476,524
Computer Information Technology

Image Processing for Teaching (IPT) brings a powerful technology to schools and two-year colleges where students use this state-of-the-art tool for exploration and analysis, and for learning problem-solving skills, computer and imaging technologies, and specific image processing skills which are becoming increasingly important in the modern workplace. IPT's past success at exciting students about science and mathematics by bringing inquiry- and discovery-based learning to students of all ability levels has created considerable demand for implementation in vocational/technological education settings

The IPT project is producing curriculum materials targeting technological education programs. Workshops are being designed and conducted to provide the faculty development necessary for successful implementation. IPT further supports implementation with follow-up services,

including toll-free telephone and e-mail communication, an annual conference, and periodic video conferences. The team of expert teachers play a primary role in all planning, development, and instructional activities. The stream of interdisciplinary activities, keyed to occupational clusters, keeps instructors and their students on the cutting edge of technology while using a demonstrated powerful tool for learning.

Title: Preserving the Legacy: A Comprehensive Curriculum and Materials Development Project in Support of Advanced Environmental Technology Education

Sally V. Beaty
Intelecom Intelligent
Telecommunications
150 East Colorado Boulevard
Suite 300
Pasadena, CA 91105

DUE 9454521
FY 1994 $ 499,988
FY 1995 $ 499,989
FY 1996 $ 499,989
Environmental Technology

Preserving the Legacy is an educational print and video series being produced by INTELECOM Intelligent Communications in association with the Partnership for Environmental Technology Education (PETE) and Van Nostrand Reinhold Publishers. This series was designed primarily for two-year community and technical college students seeking employment in environmental technology. The series can be used in traditional classrooms, for televised distance learning programs, or in companies providing their employed environmental technicians with worksite education. *Preserving the Legacy* will be of interest to anyone desiring information about industry compliance with environmental regulations.

Preserving the Legacy textbooks and videos are based on these core curriculum topics: (1) Introduction to Environmental Technology; (2) Waste Generation/Reduction/Treatment; (3) Site Characterization, Sampling and Analysis; (4) Basics of Toxicology; and (5) Basics of Industrial Hygiene. *Preserving the Legacy* will also include a handbook called *Communications for Environmental Technology*, a collection of practical exercises to develop on-the-job communications skills. Each of the 15 videos will be accompanied by a teacher guide suggesting multiple ways the series can be coordinated for maximum effectiveness.

Title: Establishment of an Instrumentation Calibration Laboratory

Ron Ingle
Piedmont Technical College
Emerald Road, Box 1467
Greenwood, SC 29646

DUE 9454536
FY 1994 $123,904
Engineering Technology

This project is creating an instrumentation calibration curriculum strand for engineering technology students, science students, and technicians. The curriculum focuses on a laboratory component consisting of three independent but integrable modules that provide hands-on experience with equipment measuring: (1) voltage, current, resistance, and power; (2) fluid flow, and (3) pressure, temperature, and volume. The resultant curriculum consists of 10 modified or new courses affecting 16 engineering technology and science faculty and is being offered to students in 7 different majors. The project is affecting, both directly and indirectly, area secondary school students and two-year college students statewide. It is producing a replicable model for how two-year colleges can adequately produce the type of broadly educated technician needed to lead in instrumentation calibration design and operation in high-performance industries.

Title: A Partnership for Excellence in Engineering Technology Education

Wayne R. Hager
Pennsylvania State University
School of Engineering Technology
245 Hammond Building
University Park, PA 16801

DUE 9454547
FY 1994 $ 282,000
FY 1995 $ 376,000
Manufacturing

This project represents a partnership between the York County Area Vocational-Technical School, the York City Schools, Penn State University (at its York, Harrisburg and University Park two-year campuses), regional industry, and the Pennsylvania Department of Education. The partnership is developing a comprehensive model for technological education for 11th grade through the associate degree level with possible extension to the baccalaureate level. The model focuses on manufacturing curriculum and educational processes. It is producing integrated and interdisciplinary modules, teaching materials, and resources for seven courses.

The modules are being developed collaboratively by teachers and faculty. The modules, which focus on technical topics, are being developed within the context of teacher/faculty workshops which include enhanced pedagogical techniques. Use of the modules is reinforcing technical topics within the secondary school curriculum and bringing enhanced teaching techniques to the college curriculum. All educational levels see better integration of topics and understanding of the interdependence of mathematics, science, and technology.

The project anticipates substantial dissemination to secondary and postsecondary faculty at other Penn State locations and to faculty across the state and nation. The project plan capitalizes on and integrates a variety of current efforts to coordinate technological education in the state and region.

Title: Establishing New Technology Education and Rural Area Networks

Chandler H. Stevens
Minnesota Riverland Technical College (Austin Campus)
1900 NW Eighth Street
Austin, MN 55912

DUE 9454551
FY 1994 $271,802
FY 1995 $228,198
Computer Information Technology

A two-year project in curriculum and network development is being undertaken by two two-year colleges (Minnesota Riverland Technical College and Austin Community College) together with universities and secondary schools—initially Mankato State University and Austin Secondary School. This project focuses on educating builders of information highways and local byways by focusing on "coNets"—cooperative networks that link communities and companies regionally as well as within evolving national and global information infrastructures.

The last two years of secondary school and the last two years of university baccalaureate degrees (in engineering, information science, etc.) provide a "2+2+2" context for developing a two-year associate degree in interactive mass media and networking communications. Students study core, general, and technical courses and then select options—tentatively called digicom (electronics), multiware (computers), and intervision (mass media). Practicums entail student work on development of a "coNet" to serve a local community and involve secondary schools as public access sites, equipped with terminals and kiosks.

This two-year project is intended to help set the stage for development of both: CoNet supporting curricula not just within two-year colleges but within "2+2+2" education extensions, and a Southeastern Minnesota CoNet regional community network as a potential model for rural regions in the United States and globally.

Title: An Advanced Biotechnology Education Partnership Program

Joy A. McMillan
Madison Area Technical College
Dept. of Biotechnology
3550 Anderson Street
Madison, WI 53704

DUE 9454555
FY 1994 $ 400,000
FY 1995 $ 400,000
FY 1996 $ 200,000
Biotechnology

The goal of the project is to provide skilled employees for the biotechnology industry. To achieve this goal, a collaboration is being established between the Biotechnology Laboratory Technician Program at Madison Area Technical College, the University of Wisconsin Teacher Enhancement Program, and the industry-based BioPharmaceutical Technology Center Institute. This project is a well-coordinated, highly integrated effort to: (1) develop and disseminate curriculum materials specifically designed for technician training at the two-year associate degree level; (2) provide teacher enhancement activities in bibtechnology including summer institutes and mentoring and curriculum development partnerships for associate degree and secondary level school teachers; and, (3) support the development and coordination of industry-led, statewide programs to offer work-based experiences for secondary school students. The program links together the development of instructional materials with faculty enhancement, student laboratory experiences, and school-to-work initiatives

Title: Science Technology: Knowledge and Skills

David K. Lavallee
American Chemical Society (ACS)
1155 16th Street, NW
Washington, DC 20036

DUE 9454564
FY 1994 $ 500,000
FY 1995 $ 500,000
FY 1996 $ 500,000
Chemical Technology

The Science Technology: Knowledge and Skills curriculum project (SciTeKS) fills the void of science-oriented technical courses in Tech-Prep and similar school-to-work transition secondary school programs. The project is designed to develop print and multimedia student and teacher materials for large context modules involving chemistry, biology, and earth/space sciences. The development includes curriculum design recommendations and models, multimedia instructional and reference materials for students, suggestions and models for implementation,

support for teachers, and guidance for assessment. The curriculum is designed to develop, in secondary school students, skills in teamwork, problem solving, communication, and other capabilities considered critical for their success in the workplace and/or in further education. The SciTeKS project provides a two-year science curriculum for a variety of school-to-work programs. Students completing SciTeKS are ideally prepared to enter immediate employment or college technician programs based on biology, chemistry, or earth/space sciences. The pedagogical strategies are being developed by a team of secondary school, college, and industrial participants.

Title: A Consortium for the Development of Advanced Manufacturing Education

Bartlett M. Sheinberg
Houston Community College
1550 Foxlake Drive, Suite 102A
Houston, TX 77270

DUE 9454569
FY 1994 $ 304,000
FY 1995 $ 300,000
Manufacturing

The primary purpose of this project is to create a model technology education program beginning with a selected discipline and adapting it to other engineering technologies. The project is creating a model of collaboration between secondary schools, two-year and four-year colleges, educational and work force agencies, professional organizations, and private industry. This project involves an informal consortium between Houston's Spring Branch Independent School District, the Northwest College of the Houston Community College System, the College of Technology of the University of Houston, and selected private industry partners. The project encompasses: (1) a needs assessment of industrial educational and training requirements; (2) curriculum development at the secondary, community college, and four-year college levels; (3) faculty/student development through educational and industry mentor/apprenticeship opportunities; and (4) and evaluation of project performance.

Title: Hands-On Physics: A New Conception of Physics

Robert Tinker
Concord Consortium
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Concord, MA 01742

DUE 9454575
FY 1994 $ 432,743
Physics

Hands-On Physics represents a major reconsideration of introductory physics which takes full advantage of the powerful insights learned about how students learn and the new opportunities technologies offer. The material targets students headed for technological careers at the secondary school and two-year college level. The project is a collaboration between a small central staff and practicing teachers and faculty who are developing, testing, and revising the material in actual classrooms. The Concord Consortium is a collaboration between TERC, MIT (Massachusetts Institute of Technology), and several community colleges in Massachusetts.

Title: A Model Rural Appalachian Partnership to Improve Technology Education through Faculty Enhancement and Curriculum Development Activities

Gary T. Laing
Wytheville Community College
1000 East Main Street
Wytheville, VA 24382

DUE 9454577
FY 1994 $ 197,873
Manufacturing

This project is designed to significantly improve the quality of technological education in Southwest Virginia by increasing the capability of five community colleges to respond to industry-identified needs for advanced manufacturing technology (AMT) education. The project activities serve as a model for rural Appalachian colleges and are coordinated through the Southwest Virginia Advanced Manufacturing Center, formed through the consortium of five community colleges. The project involves two components: (1) enhancement of faculty skills and knowledge to teach the advanced technologies required by AMT curricular courses via "back-to-practice" internships in industry and attendance at seminars and workshops; and (2) initial development of common AMT curricular courses by cross-disciplinary teams comprised of faculty from the five participating community colleges, representatives from regional business and industry, and faculty from area secondary schools and four-year institutions.

Title: Kentucky Advanced Technology Education Project

Anthony Newberry
University of Kentucky
Community College System
Breckinridge Hall
Lexington, KY 40506

DUE 9454585
FY 1994 ATE $ 696,300
FY 1994 ILI $ 103,700
Mathematics

The Kentucky Community College System is establishing computer facilities at each of its 15 widely separated community college campuses. These new facilities are being utilized for statewide reform of the algebra level and calculus mathematics which form part of the curricu-

lum for students in Advanced Technological Education programs. The laboratories also support development of new two-year curricula in telecommunications and computer system management. A system of formal courses (taught using satellite facilities) to train faculty and staff to maintain the network system is catalyzing Continuing Education/Community Service programs in the use and administration of network systems. Colleges are also developing the capability to offer a new associate degree program in network system administration. At the conclusion of this project, approximately 40% of the System's intermediate and college algebra level mathematics courses will be taught as integrated courses in a collaborative learning environment using technology as a learning tool. While 15,000 students across Kentucky are directly benefitting from the revised curriculum during the actual project period, the project will ultimately affect many thousands more students and ordinary citizens.

Title: Advanced Technological Education Programs in Semiconductor Manufacturing

David Hata
Portland Community College
Department of Microelectronics Technology
P.O. Box 19000
Portland, OR 97219

DUE 9454589
FY 1994 $ 100,000
FY 1995 $ 100,000
Electronics

The Portland Community College–Intel Corporation cooperative program in semiconductor manufacturing education is being transported to two other sites: The Southwestern Indian Polytechnic Institute and Albuquerque Technical Vocational Institute with Intel; and Chemeketa Community College in Oregon with Siltec Silicon. This academic program is characterized by a solid foundation of science, mathematics, and communications skills, along with specialty courses offered using industry facilities. Project activities include curriculum transfer, faculty development, course implementation and updating, instructional delivery, program assessment, and dissemination of project results. A central feature of the project is an annual 3-day workshop at which faculty participants collaborate on how courses should be taught, course content and level, student assessment, and specification of best practices identified at the various sites.

Title: Integrating Technical Applications into the Learning of Mathematics: A Collaborative Effort

Reginald K. Luke
Middlesex County College
Department of Mathematics
155 Mill Road
Edison, NJ 08818

DUE 9454604
FY 1994 $ 169,813
Mathematics

This project involves an interdisciplinary development of technical mathematics instructional modules, emphasizing the problem-solving approach; the scientific method; and realistic, real-world problems. Representatives from business and industry, in particular those from the Princeton Plasma Physics Laboratory, are providing technical and industrial perspectives on scientific and engineering applications. The graphing calculator, linked with a portable sensor and probe setup, called the Calculator Based Laboratory (CBL) system, is the technological instructional tool chosen for classroom and laboratory use. Over a two year span, a total of 10 curriculum teams, comprised of Middlesex County College mathematics and science/engineering faculty working cooperatively with teachers from local secondary schools, are producing 30 instructional modules to be used at the secondary school level as well as in technical college curricula. A series of conferences and workshops is being held to assist participants in mastery of these technological tools, as well as effective problem-solving and cooperative learning strategies. The instructional modules are being disseminated through the Middlesex County College network of local secondary schools, a consortium of regional community colleges, the New Jersey Statewide Systemic Initiative for Improvement of Mathematics and Science, and professional mathematics associations.

Title: Technology Instruction for the 21st Century

Bernard E. Mohr
CUNY Queensborough Community College
56th Avenue Springfield Boulevard
Bayside, NY 11364

DUE 9454613
FY 1994 $197,013
FY 1995 $205,300
FY 1996 $110,652
Electronics

Multimedia-based curriculum materials are being developed to support technology education in data acquisition,

embedded systems, and multimedia and high speed networks. These materials, which include networked laboratory manuals, text and student exercises, are available in a modular format to facilitate their incorporation into technology education courses at other institutions. A significant evaluation component is included to assess the effectiveness of the multimedia materials, especially with respect to learning outcomes for members of underrepresented groups. Six 1-week summer workshops (two each year over a 3-year period) are being offered to disseminate products completed in the project and to assist faculty in developing the capability to author effective multimedia-based materials.

Title: Two-Year Associate of Technology Curriculum Development for GIS/GPS Technologies

James L. Keating
Kansas State University - Salina
2409 Scanlan Avenue
Salina, KS 67401

DUE 9454618
FY 1994 $ 500,000
Geographical Information Systems

This project is developing and distributing a curriculum for an associate degree in the fields of Geographical Information Systems (GIS) and Global Positioning Systems (GPS). The projected need for trained GIS and GPS technicians is high because within the next decade, every plane, ship, and most vehicles will use GIS and GPS. Governments will rely on these technologies to track, tabulate, and map environmental, census, and tax data.

In cooperation with a network of eight community colleges, an innovative curriculum is being planned and tested which links the environmental, legal, and business experience of the partner colleges with the lead institution's experience in GIS/GPS and engineering technology. The curriculum, and all support materials, are being used as a vehicle to ease articulation between other schools (secondary, two-year and four-year) that are interested in adding GIS/GPS to their curricula. The materials are also being disseminated through national publishers, journals, and a national educational association.

Title: A Revision of Technical Physics

Robert W. Eshelman
Henry Ford Community College
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Dearborn, MI 48128

DUE 9454620
FY 1994 $ 129,670
Physics

Henry Ford Community College (HFCC) is revising the curriculum of its introductory Technical Physics course, a class required for students in career education programs such as electrical/electronics technology, energy technology, industrial drafting, manufacturing engineering, and robotics. With approximately 200 students enrolled in Technical Physics each year, the College has a significant population for its study.

The revised course incorporates Workshop Physics, technological applications, and Writing Across the Curriculum; and is being aligned with the National Science Education Standards. Working closely with a steering committee comprised of industry representatives and faculty from other colleges, the HFCC project team is determining current technological applications which require the physics that is included in the introductory course. Industry is also contributing to the design of the writing component of the technical physics course, providing samples of technical reports appropriate in the industrial context.

Title: The Application-Based, Technology-Supported, One-Track Mathematics Curriculum Program (ATO)

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DUE 9454627
FY 1994 $469,923
Mathematics

The Mt. Hood Community College (MHCC) Mathematics Division is developing, implementing and disseminating a comprehensive Application-based, Technology supported, One-track Mathematics Curriculum for all students (baccalaureate preparation and technical preparation). The four levels of study incorporate the National Council of Teachers of Mathematics (NCTM) Curriculum and Evaluation Standards and the Secretary's

Commission on Achieving Necessary Skills (SCANS) recommendations. The curriculum development responds to the education reform movement in mathematics while addressing the lack of appropriate course materials targeting community college students; the lack of a framework to train adjunct mathematics instructors (on which the community college heavily relies); and the lack of articulated curriculum for the same level of mathematics taught in middle schools, secondary schools, community colleges and four-year schools.

The following are the three objectives for development and implementation of the Applications, Technology, One-Track (ATO) Program: (1) to develop and publish course materials for Levels II and III (applications oriented algebra) of ATO: a textbook for each level that fully integrates the use of technology and hands-on activities and real-world interdisciplinary applications supplement; (2) to develop a framework for the ongoing staff development of community college adjunct mathematics faculty to enable them to effectively deliver a coherent mathematics curriculum; and (3) to develop, in collaboration with middle schools and secondary schools in the community college district, an articulated coherent mathematics curriculum that addresses content-based proficiency assessment strategies and supports uniform implementation of the NCTM Standards in mathematics education.

Methods to accomplish these objectives build on previously established team efforts at MHCC; partnerships with industry; and collaborative activities with other schools including middle schools, secondary schools, and four-year colleges. The Northwest Regional Educational Laboratory is instrumental in the evaluation of the project, along with the Program Management Evaluation/Assessment Advisory Team.

Title: Environmental Technology Education Transfer to Native American Tribal Colleges

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P.O. Box 2647
Grand Junction, CO 81502

DUE 9454633
FY 1994 $ 399,778
Environmental Technology

Native American Tribal environments have often historically been neglected; tribes have had inadequate resources and expertise to deal with cleanup and prevention of further pollution. Because tribes need to know how to measure and analyze their own environmental risks, a technologically educated and trained Native American environmental workforce is needed. This project is using existing resources to create and transfer an interdisciplinary environmental technology associate degree curriculum for tribal colleges and other community colleges with roles in educating American Indians. It is also providing faculty enhancement, institution materials, and a rotating equipment program. The curriculum focuses on those technologies used for environmental monitoring, site assessment, solid waste management, and pollution prevention because these are the prominent environmental issues facing tribal lands. From incorporation of support disciplines (mathematics, science, communications), students are developing analytical skills for situations in which they are not specifically trained. Mesa State College and Navajo Community College are the resource colleges, each with different established environmental technology programs. The pilot group of tribal and tribally related colleges consists of Navajo Community College, Northern New Mexico Community College, Crownpoint Institute of Technology, and Southwest Indian Polytechnic Institute. The project methodology is interactive, using workshops, site visits, iterative writing/review, and hands-on activities. The tribal colleges are part of the process from the beginning and will take ownership of the curriculum.

Title: Advanced Biotechnology Education Project

Barry L. Werner
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Springs Road
Bedford, MA 01730

DUE 9454642
FY 1994 $ 347,978
FY 1995 $ 392,307
FY 1996 $ 392,109
Biotechnology

This project is developing coordinated secondary school and two-year college biotechnology curricula. Supporting activities include teacher and faculty training, industry mentor education, program materials development, job shadowing, and the recruitment and retention of underrepresented groups of students. Principal collaborators include a two-year college, secondary schools, four-year colleges and universities, biotechnological industries, and government. Biotechnology programs are being articulated for different educational levels. Major developments include classroom and multimedia materials. Also, developed materials are being disseminated through various media such as publications, videos, electronic linkages, workshops, and conferences.

Title: Establishing and Transporting Science, Computer and Electronics Technology Curricula to Rural Minority Students through Simulated Labs and Telecourses

G. Robert Converse
University of Hawaii/Maui
Community College
310 Kalahumanu Avenue
Honolulu, HI 96822

DUE 9454647
FY 1994 $499,938
Computer Information
Technology

Maui Community College (MCC) is establishing and transporting a distance education project that involves teaching science, computer, and electronics technology curricula to rural minority students through interactive teleclass lectures and simulated multimedia laboratory experiences. The first stage of the project encompasses the development of multimedia institution materials for a model Certificate and Associate in Science Degree curriculum in Electronics and Computer Engineering Technology (ECET). The program is cooperatively designed to provide technical certification and/or transfer opportunities to baccalaureate degree programs at the University of Hawaii-Manoa or distance education offerings at the Maui Research and Technology Center from the University of New Mexico. The second stage focuses on developing multimedia laboratory exercises for the ECET curriculum in a format transportable to outreach by reducing dependence on costly laboratory equipment and faculty travel. This innovative format utilizes simulated laboratory experiments by developing, purchasing, and integrating multimedia software for Computer-Aided Instruction (CAI) workstations. The ECET program is being field-tested on the main campus and then extended to the college outreach centers and is recruiting students from MCC's densely populated Pacific Island and Asian community. The third stage is the extension of the simulated methodology to other science and mathematics courses at the college. The final stage involves teacher and faculty enhancement. Effectiveness of this approach is being demonstrated through scheduled workshops for other college instructors state-wide and to secondary school teachers. The project results are being disseminated on a national level.

Title: Technical Sciences Academy Proposal

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DUE 9454651
FY 1994 $ 630,000
Core and One or More
Specific Technologies

This project is creating a Technical Science Academy as a division within the Amarillo Scientific Arts Academy. The Academy serves secondary and postsecondary students from Amarillo and the surrounding area through state-of-the-art curricula and laboratories in mathematics, science, and technology. The project is providing a hands-on curricula for majors in Electronics Engineering Technology and Hazardous Materials Technology. The project implements a seamless educational strand which removes barriers between secondary and postsecondary levels. Team teaching, proficiency based curricula, and cooperative learning are the major emphases of the project, as well as the implementation of internships, cooperatives, and interactions with industrial partners for faculty and students. The project is appealing to underrepresented groups including women and minorities. This project grew out of a committee effort which brought together educators and business/industry leaders to generate realistic ways to address national education goals.

Title: Advanced Technical Education (ATE) Alliance

James A. Jordan
Consortium for Advanced
Manufacturing International
(CAM-I)
1250 E. Copeland Road, Suite 500
Arlington, TX 76011

DUE 9454655
FY 1994 $ 499,950
FY 1995 $ 499,950
FY 1996 $ 499,950
Manufacturing

This project is developing, delivering, and evaluating a national curricula to educate technicians who are employable in 21st century manufacturing enterprises. Instructional delivery is being assisted by distance learning technology and the National Information Infrastructure. Added funding comes from local, state, and other federal sources. CAM-I is leading an Advanced Technical Education (ATE) Alliance, including as members Lawrence Technological University; C.S. Mott Community College; Goodrich, Michigan area schools as well as affiliates

from other school districts in the Flint, MI area; clusters of community colleges, school districts, and CAM-I company members in Oak Ridge, TN; Kansas City, MO and Kansas City, KS, Los Angeles, CA; the Mescalero Apache Reservation, NM; Lehigh University; and the National Technological University.

The knowledge and skill needs for a new breed of agile technicians who are able to respond knowledgeably, effectively, and quickly in highly competitive, rapidly changing global manufacturing, are being addressed. The ATE Alliance is meeting these needs by combining existing best practices modules already developed by its members and affiliates, with newly developed modules in an integrated, flexible, grade 11–14 program in mathematics, science, communications, computing, and manufacturing enterprise technologies in a pilot program centered at C.S. Mott Community College and Goodrich, MI, area schools.

The Alliance is sharing the modules using nationally scaleable distance learning techniques. The curricula are being reinforced with teacher training, job site education for teachers and students, and public information programs. The ATE Alliance is establishing a virtual school, combining a national network of educational resources to provide optimized education for employability. The pilot curriculum modules are being disseminated via distance learning techniques to the members and the affiliated associate degree granting institutions and school districts. The curriculum is being evaluated through performance based assessment. Successful modules are being further disseminated throughout the United States by CAM-I in publications, public forums, and through CAM-I's national network of industrial members. The ATE Alliance provides 21st century education in clusters with large, diverse minority populations, preparing students for employment in challenging and rewarding careers.

Title: Advanced Technological Education in Biotechnology: A Community College Partnership with Industry

Barbara Des Rochers
Peralta Community College
District Office
333 East Eighth Street
Oakland, CA 94606

DUE 9454657
FY 1994 $209,073
Biotechnology

This project involves an integrated and vocational enriched program in biotechnology. The program leads to a certificate and associate degree and incorporates basic science, computer use, applied mathematics, reading skills, writing skills, and critical thinking. Committed partnerships include industry, a 2-year college, secondary schools, and government. The project also address the needs of a rapidly changing workforce by reducing barriers for entry of women and minorities into science and mathematics based occupations. New instructional methods are being incorporated into the curriculum, and cooperative learning environments are being provided through mentorships and internships with industry.

Special Projects

Title: Curriculum and Pedagogy Standards for Two-Year College and Lower Division Mathematics

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AMATYC
North Lake College
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Memphis, TN 38134

DUE 9443721
FY 1995 ATE $24,300
(TOTAL $ 34,300)

The recent focus in the mathematical community on calculus, advanced technology education, teacher preparation, and reform at the K-12 level is providing a framework for considering mathematics courses taught at two-year colleges and lower division mathematics courses taught at other institutions of higher education in this country. These courses are important elements in continuum and pipeline issues, as well as general mathematical needs of students not continuing in mathematically oriented fields of studies. The American Mathematical Association of Two-Year Colleges (AMATYC) is undertaking a leadership role in designing a framework for systematic reform of college mathematics in the curriculum leading to calculus.

The first stage was a meeting of an AMATYC National Steering Committee consisting of leaders of AMATYC, the Mathematical Association of America (MAA), and the National Council of Teachers of Mathematics (NCTM) as well as others actively involved in the development of innovative mathematics curricula and Standards. In the second stage, a small invited conference of a National Task Force was held to establish guidelines for the development of a set of Standards for two-year college and lower division mathematics and to formulate a plan to build consensus for mathematics reform among two-year college and university constituencies.

The AMATYC Standards Project is designed to plan, write, and disseminate standards for curriculum and pedagogy for two-year college and other lower division undergraduate mathematics courses. In particular, mathematics courses below the level of calculus are being addressed. This project is filling an important need, serving as a connecting bridge between the NCTM Standards, related projects at the secondary school level, and the reform efforts in calculus at the college level.

This supplement is allowing for a final revision of the Standards document based on input from the mathematics community with special attention to those involved in technical education, teacher preparation, and dissemination to the community. This third stage in the development of standards involves the establishment of a council to advise on special issues including workforce development, technical education, teacher preparation, and diversity.

Title: Faculty Development and Dissemination for ATE Program

Lynn Barnett
American Association of Community Colleges
One Dupont Circle, NW, Suite 410
Washington, DC 22036

DUE 9540310
FY 1995 $ 15,439

This supplement is designed to augment an outreach grant to the American Association of Community Colleges (AACC) for faculty development and dissemination for the ATE program. In particular, these funds are augmenting a previous grant to allow AACC, in conjunction with the NSF, to host a preconference leadership meeting and a FY 1994 ATE principal investigator's meeting. The workshops focus on developing a vision for the future of technological education. The overall issue addressed is: "Building and implementing a program to impact and shape the quality of the technological workforce." The purpose of a preconference workshop which brings together 20 to 25 national leaders of industry, government and education, is to focus on critical issues related to advanced technological education; to develop a vision for the future of technological education; and to discuss how the NSF's ATE program can impact and improve technician education at the National level. The principal investigator's (PI) conference brings together the PIs from FY 1994 awarded Centers and Planning Grants for Centers, as well as those from the large curriculum projects.

Title: The Two-Year College in the Twenty-First Century: Breaking Down Barriers

Mary Beth Monroe
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College Park, MD 20740

DUE 9450160
FY 1995 $208,348
FY 1996 $358,975
FY 1997 $360,125
FY 1998 $257,957

The project is improving learning opportunities for students at two-year colleges—those that transfer, those that become technicians in the high-technology workplace, and all students for whom physics serves as a part of their college education. The project is establishing a network of physics faculty in two-year colleges. The network

consists of 15 regional organizations, coordinated and linked by a national steering committee. The development of the network of colleagues allows two-year college faculty to share their successes as teachers and scholars with each other and with the broader physics community; it increases their awareness of current developments in physics education research and innovative teaching strategies; and it decreases the sense of isolation felt by many two-year college faculty members.

During the 4- year project, 15 Regional Coordinators and their Regional Teams, selected and mentored by a Steering Committee, are organizing and hosting small local meetings and are leading participants as they develop projects and programs within their regions relating to critical and topical issues that may be particularly important in the region. Many of these issues are being developed from the work begun at the 1989 topical conference entitled "Critical Issues in Two-Year College Physics and Astronomy—1990 and Beyond" supported by the American Association of Physics Teachers (AAPT) and the NSF, and at the 1992 NSF Workshop on the "Role of Professional Societies in Science, Technology, Engineering, and Mathematics Education in Two-Year Colleges." To enlarge the network and provide a national forum, the Regional Coordinators and three elected delegates from each region are participating in a national meeting, convened as an AAPT Topical Conference, where various speakers and consultants are engaging participants in a more global discussion of critical issues and issues of particular and timely pedagogical significance. Conference participants are making recommendations for national reform.

In the project, the Steering Committee is producing three proceedings from annual meetings, compiling and publishing demographic data better describing the two-year college physics education communities, and writing a major report characterizing the two-year college faculty and their impact on the physics education community of our country. In addition, 15 regional structures are being established, under the auspices of AAPT, which allow for the continued collaboration on issues of importance to the physics education communities.

Title: A National Workshop to Develop a National Agenda for the Future of Engineering Technology Education

George H. Sehi
Sinclair Community College
444 West Third Street
Dayton, OH 45402

DUE 9550659
FY 1995 $ 111,319

A 3-day invitational workshop is being held to examine issues and charter a national agenda for the future of engineering technician education. The workshop involves key individuals from business and industry, engineering and engineering technology educators, top level administrators from two-year colleges, and government representatives. The workshop participants are involved in predicting, identifying, and rank-ordering the changes that must occur in the engineering technology education process over the coming decade. In multiple breakout sessions the participants discuss many diverse issues, such as: (a) future demand for technical skills; (b) the nature of future technical employment; (c) industry recognition of associate degree engineering technicians; (d) curriculum changes for educating future technicians; (e) new institution tools, technologies and techniques; (f) accreditation and policy issues; (g) strategies for development and implementation of alternative and innovative programs; (h) effectiveness of various national movements (Tech-Prep, school-to-work, etc.); (i) preparation of future community college engineering technology faculty; (j) articulation with four-year engineering, engineering technology, and other science and technology programs; (k) assessment process and academic standards; (l) role of professional societies and professionalizing technician careers; (m) and varied paths for technicians.

The workshop report is being disseminated to academic institutions, the private sector, and selected government agencies. Planning and implementation of the workshop is a cooperative effort involving Sinclair Community College, the American Society for Engineering Education (ASEE), the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET), and the NSF.

Title: Community College Science Connections Conference

Alfred Wohlpart
Oak Ridge Associated Universities
Science/Engineering Education
Division
Oak Ridge, TN 37831

DUE 9552954
FY 1995 $ 40,000

The Community College Science Connections Conference is enhancing collaboration and articulation between community colleges and four-year colleges and universities in science and mathematics education and teacher preparation. The conference seeks enhanced partnerships in science and mathematics education at the undergraduate level and improved student awareness of science and mathematics teaching as a career. The workshop is focusing on communication and cooperative interaction between 2- and 4-year institutions in science and mathematics education and teacher preparation; improved science and mathematics instruction in introductory science and mathematics courses; baseline information on partnerships to share as a vital career choice; and regional groups to work for systemic impact. The workshop is resulting in a report of partnerships and proceedings of the conference, and the establishment of an Internet home page for Community College Science Connections information.

Title: Physics Education in the Two-Year Colleges: A Neglected Resource

Michael Neuchatz
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Education and Employment
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DUE 9453180
FY 1995 $99,988
FY 1996 ATE $93,000
(TOTAL $193,000)
FY 1997 $92,692

Two-year colleges have the potential to provide education programs which produce a technically sophisticated workforce able to respond to the changing needs of the U.S. economy. In addition, there have been calls to reform and update the science and technology programs at these institutions. Yet, surprisingly little is known about existing programs or the faculty who lead them. In order to assess the success of the reforms that are being proposed, it is essential to have an understanding of current conditions in these programs. There are several reasons to examine physics in detail at the two-year college level: (1) the existence of detailed information about physics education at both the high school and four-year college level allows physics education at the two-year college level to be placed in a broader context; (2) physics courses are among the core requirements for most technology-based programs at two-year colleges, and thus help define the overall quality of these programs; and (3) since physics is relatively well-defined as a discipline and its two-year college faculty small in number, the study serves as a model that can be applied to other disciplines. The primary vehicle for studying physics education at two-year colleges is a survey of all full-time and part-time faculty who teach physics. A two-stage approach is being employed to define this population. Academic deans and directors of vocational programming at each two-year college are being asked to identify relevant department chairs, who will then be asked to indicate all full- and part-time faculty who teach physics. The project design anticipates a high response rate from both groups.

All faculty identified by the chairs are receiving a detailed questionnaire seeking information about their workloads, education and employment backgrounds, the facilities and resources available to them, opportunities for professional development, teaching methods and institution materials used, the nature of articulation agreements with nearby high schools and four-year colleges, and other key indicators of their work environment. In addition to the survey, face-to-face interviews with chairs and faculty (both full- and part-time) are being conducted at 12 two-year colleges, chosen to reflect the variation in institutional size and control, academic orientation, and geographic region. The interviews provide an opportunity to probe issues which are not easily captured in a self-administered format. In addition, six to eight students at each institution are participating in a student focus group. The students' perspectives on the quality and difficulty of their physics courses, their interactions with the physics faculty, their reasons for taking physics, and their educational goals are enhancing the information gained through the faculty survey and interviews. The results of this research are coordinated with other higher education studies and disseminated to representatives of local industries; department chairs and faculty at two-year colleges, high schools, and four-year colleges; and other professional organizations active at the two-year college level. The investigators are actively collaborating with two-year college groups to provide relevant and timely information to current and proposed regional two-year college development programs.

Title: Ethics and Biotechnology: A Blueprint for the Future

Catherine Propst
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Center for Biotechnology
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Evanston, IL 60208

DUE 9554445
FY 1995 $69,980

This project is a workshop on "Ethics and Biotechnology: A Blueprint for the Future." The Directors of the Biotechnology Center at Northwestern University are collaborating with the Executive Officer at Palomar College, a two year college in San Marcos, CA and with Providence St. Mel, an inner city high school in Chicago. The workshop at Northwestern University's Evanston Campus is designed to provide a blueprint for the incorporation of ethics in the teaching, practice, and management of biotechnology. The information is being used to add to the biotechnology curricula for technician education and to encourage joint efforts by secondary schools, two-year colleges, four-year colleges and universities, and industry. In addition, it provides a mechanism to develop creative ways for ethics for biotechnology technicians to be taught, practiced, and managed in their respective institutions.

Title: Expanding the Network of Community Colleges in Advanced Science and Engineering Technology Education

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American Association of
Community Colleges
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Washington, DC 20036

DUE 9552975
FY 1995 $237,320

The American Association of Community Colleges is conducting a 2-year project consisting of a series of interconnected activities designed to enhance the quality of science, mathematics, engineering, and technological education in community colleges. The activities include (a) two national meetings approximately 1 year apart of representatives from groups interested in science and engineering advanced technological education including the principal investigators from many current Advanced Technological Education (ATE) projects and centers, private and public sector leaders, and professional associations; (b) a roundtable of experts on issues in science and engineering advanced technological education; and (c) a live national teleconference on such issues. The sequence of programs is designed to provide people interested in advanced technological education opportunities to network with one another; identify significant issues related to the delivery of effective science and engineering technological education; disseminate the results of these activities to a broad national audience; and, broadcast a national teleconference on these issues.

Expected outcomes include a sharper understanding of the characteristics of successful science and engineering technological education programs for all stakeholders in this area, the development of additional resource documents of use to current and future participants in these educational programs, and an increased awareness of the value of each of these activities for delivering information to a broad audience.

Title: National Forum on Critical Issues in Environmental Technology Programs at Two-Year Colleges

Ellen Kabat
Eastern Iowa Community
College District
500 Belmont Road
Bettendorf, IA 52722

DUE 9453181
FY 1995 $ 83,202

A 2-day invitational workshop is being held to examine critical issues relating to environmental technology education. The workshop involves postsecondary educators in the fields of mathematics, science, environmental education, and technology as well as employers, secondary school educators, and government representatives. Forum participants are identifying and prioritizing issues and developing recommendations concerning Environmental Technology education at two-year colleges. Each working group is being directed by a technical working group chair recognized as an expert in a particular area. The working groups are addressing issues in the professionalization of environmental technician education; curriculum and program development and implementation; preparation, credentials, professional advancement, and continuing education of faculty; human resources including recruitment, retention, and placement of students; current and future employment needs for environmental technicians; and preparation of secondary school students for successful entry into postsecondary environmental technical education programs.

The workshop report is being distributed to academic institutions and the private sector as well as local and federal government staff interested in environmental technology education. Planning and implementation of the forum is a cooperative effort involving the NSF Advanced Technology Environmental Education Center (ATEEC), the Hazardous Materials Training and Research Institute (HMTRI), the American Association of Community Colleges (AACC), and NSF.

ATE Contributions to Other Funded Projects

The ATE program is contributing funds to projects submitted to several other programs to help ensure that these projects make the education of technicians a project priority. The ATE contribution is given here, and the total award from all other sources is listed in parentheses.

Title: Introduction to Molecular Biology and Molecular Diagnostics: Continuing Education for Community College Science Faculty

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Course and Curriculum Development
DUE 9455068
FY 1995 ATE $ 100,000
(TOTAL $ 450,000)
Life Science Biological

This project is integrating and expanding an instructional program for community college faculty. The project introduces molecular biology and molecular diagnostics as continuing education. The program continues to offer a week-long summer institute in molecular biology and adds to that a new summer institute in molecular diagnostics in which the principles of molecular biology find applications in several areas of biotechnology. In addition, the project is expanding follow-up program services and other participant contacts with university faculty and industry researchers. Internships for community college faculty will continue as a part of the program.

Title: REU-Site for Biotechnology

Bruce Jackson
Massachusetts Bay Community College
50 Oakland Street
Wellesley, MA 02181

BIR 9424103
FY 1995 ATE $15,000
(Total $ 55,796)
FY 1996 ATE $15,000
(Total $ 60,296)
FY 1997 ATE $15,000
(TOTAL $ 60,296)
Biotechnology

Through this award, the Directorate for Biological Sciences and the ATE program of the Directorate for Education and Human Resources are providing support for an innovative summer program that targets students from two year colleges, a student population that typically does not participate in REU-site programs. During the first 2 summers, participants are being extensively trained in various techniques used commonly in molecular biology and biotechnology research at the Massachusetts Bay Community College in Wellesley Hills, MA. During the third summer, participants will use this technical knowledge to pursue independent research at the Marine Biological Laboratory in Woods Hole, MA, or the Science Park biotechnology center in New Haven, CT. The aim of the program is to equip students with the confidence and experience necessary to enter and complete training in science.

Title: Middle Atlantic Consortium for Mathematics and Its Applications Throughout the Curriculum

Dennis DeTurck
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Rittenhouse Laboratory
Philadelphia, PA 19104

DUE 9552464
FY 1995 ATE $75,000
(TOTAL $598,206)
FY 1996 ATE $50,000
(FY 1997 $ 499,653)
FY 1998 $ 499,653
Mathematics Initiative

This project is designed to promote a climate in which faculty from all disciplines view themselves as being jointly responsible for the scientific, mathematical, and technical education of undergraduates, rather than clients and servers. To help accomplish this, a consortium comprised of the University of Pennsylvania, Villanova University, Polytechnic University, Community College of Philadelphia, two Philadelphia public schools, and the Society for Industrial and Applied Mathematics (SIAM) is planning to undertake this major initiative to integrate research and real-world applications from various disciplines into the mathematics curriculum, and to achieve more effective integration of advanced mathematics and computing into the curricula of disciplines that use mathematics.

To begin a process to achieve this overall goal, this project consists of four parts:

1. Creation of application modules for mathematics courses and mathematics modules for other-discipline courses

2. Development of basic and advanced interdisciplinary courses that integrate mathematics with specific application areas.

3. Development of applications and laboratory-oriented courses for mathematics majors.

4. Development of materials for students in courses such as business, economics, psychology, and liberal arts and humanities courses that focus on mathematical literacy issues.

Topics are chosen from a broad range of discipline areas, including biological and social sciences, as well as engineering, business, and physics modules. These modules involve many different important mathematical topics and techniques. The two different types of modules which are planned allow for multiple levels of student backgrounds. They impact multiple points of the curriculum ranging from courses for majors in fields which have traditionally used little or no mathematics, to those for lower division students in mathematics and mathematically oriented disciplines, to those for upper division mathematics majors. Several interdisciplinary courses are being created, including one incorporating mathematics, physics, and chemistry, as well as one in geographiometry. A team of faculty are also developing a 2-semester course for mathematics majors that surveys industrial uses of mathematics via applications. SIAM is providing expertise both in the development of the interdisciplinary modules and courses and in broad dissemination of materials through conferences, workshops, and products. Distribution of materials is through World Wide Web sites at the University of Pennsylvania and SIAM, as well as by commercial publication. Two particular areas of emphasis in the program are the use of application and technology for students pursuing careers as technicians in the industrial/scientific workplace and the preparation of future secondary teachers.

Title: Mathematics and its Applications in Engineering and Sciences: Building the Links

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Troy, NY 12180

DUE 9552465
FY 1995 ATE $125,000
(TOTAL $ 1,311,000)
FY 1996 ATE $125,000
(TOTAL $ 700,000)
FY 1997 ATE $125,000
(TOTAL $ 700,000)
FY 1998 ATE $125,000
(FY 1998 $ 700,000)
(FY 1999 $ 600,000)
Mathematics Initiative

The division of courses into many different departments often makes it difficult for students to grasp the intimate connections that exist between mathematics and its applications in engineering and science. To make these connections clearer RPI is developing a library of hypertext documents which link important mathematical topics with contemporary interesting applications in various fields of engineering and science. This library covers the mathematical areas normally studied by undergraduate students in engineering and science, including calculus, differential equations, mechanics and linear systems, advanced mathematical methods, and probability and statistics. The library that is created initially constitutes the basis for a constantly expanding resource that is supporting a growing movement, at Rensselaer and elsewhere, to move away from a lecture-dominated mode of instruction to a workshop or studio mode. The development of these materials involves a collaboration among faculty at Rensselaer and at a number of other Institutions, including the University of Delaware, Siena College, Virginia Polytechnic Institute, Central State University, Hudson Valley Community College, and the University of Maryland. By means of Visiting Professorships, faculty at several other institutions are also becoming involved as the project develops. After careful testing and evaluation, the library of hypertext documents is being made available on the World Wide Web, on CDs, and in printed form. Among the added benefits to Rensselaer and the other institutions directly participating in the project is a much enhanced level of cooperation among faculty who teach related courses in many different academic departments. The project is developing and testing materials that enhance the use of applications and technology.

Title: Young Scholars Program

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Botany Department
Austin, TX 78712

ESIE 9452693
FY 1995 $ 60,975
Young Scholars Program

This project is initiating a 1-year pilot Young Scholars program lasting 4-weeks in the summer in Advanced Technology Education for 24 high school students. The program emphasizes advanced technology, design, and applications. In addition to several other applications, Computer Aided Design (CAD) projects integrate various components of technology and its uses. Evening seminars discuss ethics and other topics concerning technology and the citizen. There are field trips to major industrial locations where advanced technology is used, as well as recreation and reading during the weekends and evenings. Students who exhibit a high potential for careers as technicians are being recruited nationally for the program.

Title: West Hawaii Explorations Academy: A Center for Integrative Secondary Curriculum Development

Bill Woerner
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Honolulu, HI 96804

ESIE 9452790
FY 1995 ATE $75,000
(TOTAL $ 119,958)
FY 1996 ATE $75,000
(TOTAL $ 131,654)
FY 1997 ATE $75,000
(TOTAL $ 98,728)
Materials Development

This project is establishing a secondary educational facility which differs fundamentally from traditional classroom education. The West Hawaii Explorations Academy is an operational project and work experience laboratory for secondary students. It also serves as a center for integrative curriculum development and teacher training. The project is headquartered at the Natural Energy Laboratory of Hawaii, a state funded incubation facility for scientific research and commercial operations in aquaculture and energy development. Approximately 133 10th through 12th grade students from many different backgrounds, including high-risk students, work and study full time throughout the school year. Students team with peers, staff, University of Hawaii faculty and students, graduate students, mentors, community members, and employers. Rather than attend classes, students receive credit for all of their core courses by managing and staffing a wide variety of projects. These include aquaculture and cold water agriculture research and production, alternatively-fueled vehicle research, environmental projects, aquarium site development, desalination, alternative energy development, sustainable research, and marine environments. While engaged in project work, they take modules in Records/Business/Finance, Media/Publications, Research Support, Facilities, Leadership, and Reading/Writing. The vision is partnering with a research laboratory, a university and the community to develop a new model for education with the following goals: (a) enhance the prospect that students, including high risk youth, go to college or are employed; (b) encourage inservice teachers to adopt an integrative teaching style; (c) develop preservice teachers who can implement an integrative program and modify the curriculum for high risk students; (d) increase the science, math, and engineering expertise available to students; (e) serve as a national model program in expanding education beyond the walls of the classroom and attract community and university resources; and (f) prepare and distribute a collection of exemplary materials with national scope which promote and facilitate integrative education at the secondary level. An external evaluator carefully documents project activities and student outcomes so the results can be disseminated to the profession.

Title: Sweeping Change in Manageable Units: A Modular Approach for Chemistry Curriculum Reform

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-Berkeley
School of Chemisty
Berkeley, CA 94720

DUE 9455924
FY 1995 ATE $100,000
(TOTAL $ 755,000)
FY 1996 ATE $50,000
(TOTAL $ 795,000)
FY 1997 ATE $50,000
(TOTAL $ 795,000)
(FY 1998 $ 350,000)
(FY 1999 $ 350,000)
Chemistry Initiative

The purpose of this project is to develop new curricula, materials, and methods which are enhancing the appreciation and learning of science, especially chemistry, for every undergraduate student so that all college graduates command the knowledge and skills necessary to permit continued learning, lead productive lives, and make informed decisions. To accomplish this mission, a modular approach to teaching chemistry in the first 2 years of the undergraduate curriculum is being developed and evaluated. Modules of 1 to 4 weeks present fundamental chemistry to students in the context of a real-world problem or application and emphasize the links between chemistry and other disciplines. In collaboration with the ChemLinks Coalition, modules are being developed, tested and refined at the two- and four-year colleges and research universities comprising the two consortia. Curriculum materials, including text, lab, and multimedia components that are suitable for students from diverse cultural and ethnic backgrounds and are usable at a wide variety of undergraduate institutions are being produced and distributed by an established publisher. Teaching methods which utilize current understanding of learning processes and emphasize active learning and the full spectrum of modern technologies are being supported, tested, and promulgated. A model support infrastructure for development and assessment of new materials and methods is being provided. A framework for continuous improvement of curricula is resulting from the work and will be institutionalized within the consortium. Faculty workshops and sessions at national and regional meetings are being conducted to guarantee dissemination. The consortium institutions now participate significantly in preservice teacher training and education of technology specialists, and are developing new programs in these areas. Thus, the program is strongly impacting the ATE and Teacher Preparation Programs by developing modular

materials appropriate to the task of educating future teachers and technology specialists.

Title: Establishing New Traditions: Revitalizing the Curriculum

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Madison, WI 53706

DUE 9455928
FY 1995 ATE $100,000
(TOTAL $849,968)
FY 1996 ATE $50,000
(TOTAL $849,999)
FY 1997 ATE $50,000
(TOTAL $849,941)
(FY 1998 $499,941)
(FY 1999 $499,742)
Chemistry Initiative

This project is establishing new traditions in the chemistry curriculum that optimize opportunities for all students to learn chemical facts and concepts, develop and pursue interests in chemistry and chemistry-related disciplines, and appreciate how an understanding of chemistry is important to life and living. The project is fundamentally changing the ways students, faculty, and administrators view their roles, creating a student-centered, active-learning emphasis. There are a broad range of reforms, each of which is developed, tested, modified, thoroughly evaluated, and widely disseminated. There are five main areas that apply to all levels of the curriculum: student-focused active learning; inquiry-based/open-ended laboratories; interdisciplinary course clusters to create learning communities; a topic-oriented curriculum; and information technology/computer tools. Each development in each area is carefully evaluated, and only the best survive. Evaluation provides important information about the process of transfer of innovations among Institutions of different types. To insure that the reforms are useful for all students, the consortium includes industry, public and private four-year institutions, minority institutions, and two-year colleges. The project gives special emphasis to students who choose teaching as a career option by mainstreaming these students in courses which benefit them in both content and pedagogy. Students, including those in science education, are fully integrated in the development and implementation of the project, working on both research topics and evaluation. The project also gives special emphasis to community college students in Advanced Technological Education programs to ensure that they are provided the newly developed curriculum. The students in the ATE program clearly benefit from the five main areas of thrust that this coalition is developing. All students emerge with greater comprehension and better retention of chemical knowledge, improved ability to apply chemical concepts to new problems, enhanced appreciation of the relation between chemistry and other disciplines, and the skills that enable them to work effectively in multidisciplinary teams.

Title: ChemLinks Coalition: Making Chemical Connections

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Beloit, WI 53511

DUE 9455918
FY 1995 ATE $100,000
(TOTAL $ 705,000)
FY 1996 ATE $50,000
(TOTAL $ 705,000)
FY 1997 ATE $50,000
(TOTAL $ 705,000)
(FY 1998 $ 350,000)
(FY 1999 $ 350,000)
Chemistry Initiative

The ChemLinks Coalition is undertaking a 5-year project to change the way students learn chemistry; increase scientific literacy for all students taking chemistry; and promote the process of educational reform. In collaboration with the ModularChem Consortium, faculty are developing, testing, and disseminating modular course materials that use active and collaborative approaches to learning. These materials, focused on the first 2 years of the chemistry curriculum, start with interdisciplinary questions important to students and to society (the molecular basis of life, the environment, technology). In answering them, students develop an appreciation of how science is actually done. This approach is designed to reach a broader student audience more effectively than do traditional courses, an audience that includes students who are members of groups traditionally underrepresented in science, non-science majors, and those taking chemistry as a supporting course, as well as chemistry majors. By providing a model for students preparing for careers in teaching, this approach has an impact on Teacher Preparation Programs. Collaboration among faculty from different disciplines and a number of institutions supports and reinforces those who want to make changes. These leading liberal arts colleges (Beloit, Carleton, Colorado, Grinnell, Hope, Kalamazoo, Knox, Lawrence, Macalester, Rhodes, Spelman, St. Olaf, Wooster) and research universities (Chicago, Washington - St. Louis) already have experience working together on chemistry curricular reform. An alliance with the Advanced Technology Environmental Education Center's coalition of 2-year institutions assures an impact on Advanced Technology Education Programs. By using the extensive Project Kaleidoscope network to promote reform, the ChemLinks Coalition involves a much larger and more diverse group of institutions in making systemic and sustainable changes in undergraduate chemistry education.

Title: A Workshop Chemistry Curriculum

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DUE 9455920
FY 1995 ATE $50,000
(TOTAL $ 425,000)
FY 1996 ATE $25,000
(TOTAL $ 400,000)
FY 1997 ATE $25,000
(TOTAL $ 400,000)
(FY 1998 $ 150,000)
(FY 1999 $ 150,000)
Chemistry Initiative

The City College Consortium, which includes 10 senior and community colleges at the City University of New York, and the Universities of Pittsburgh, Pennsylvania, and Rochester, is developing and widely applying a new model of teaching. This model, called Workshop Chemistry, introduces participation and mentoring by students who have recently completed the course. Small group, student-led workshops are integral to the course structure. Each week, two workshops of an hour each complement the lecture and laboratory components. The workshop model provides a collaborative learning experience that increases student involvement and provides a new role for students as mentors. In Workshop Chemistry, students learn the problem solving, communication, and teamwork skills crucial for success in the workplace while learning chemistry more effectively. Working together with the faculty, students become an active part of the community of the department. A prototype workshop model has been developed at City College in a general chemistry course for science and engineering majors, and is being expanded and refined for a broad range of courses including preparatory chemistry, chemistry for allied health sciences, organic chemistry, instrumental, and analytical chemistry. The experience of students as workshop leaders provides a natural introduction to teaching that is being formalized through a Teacher Preparation component of the project. The workshop method is also being exploited and applied in curricula for technician training, an initiative relevant to Advanced Technological Education. The project evaluates Workshop Chemistry and disseminates it beyond the bounds of the consortium. Student Workshop Manuals that include the problem solving, model building, and simulation activities of the workshops are being produced for each course. New project partners are being invited to view workshops, to participate in faculty developments, and to implement pilot workshop courses at their own institutions.

Title: Undergraduate Curriculum Development on Mechatronic Systems Engineering

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DUE 9455395
FY 1995 ATE $20,000
(TOTAL $ 290,000)
(FY 1996 $ 113,280)
(FY 1997 $ 90,999)
Course and Curriculum Engineering

The short-term objective of this project is to develop five new courses and two laboratories in mechatronic systems engineering by a Task Force that includes faculty members from Mechanical, Electrical, Computer, General Engineering, and Physics Departments at the San Jose State University, and from local high technology industry. Two faculty members from Mission College, part of the California Community College System which supplies 70,000 of the incoming students to the California State University System, are also involved in the laboratory development. In addition to new course development, significant improvements are being made in four existing courses and five existing laboratories.

The long-term objective of the activities is to establish a center for mechatronics engineering education built on the success of the above short-term effort. This center is assisting other institutions in the nation to establish mechatronic curricula for single or interdisciplinary engineering departments, as well as for human resource development for industry.

The curriculum is built on three pillars: (1) the fundamental principles of Mechatronic Technology, (2) the hands-on experience, and (3) the application of Mechatronic Technology to the industry in the region. Content in Pillars (1) and (2) is being made readily transportable to other institutions whereas the content in Pillar (3) is being developed with assistance from local industry and can be transported to other institutions in a similar industrial setting. This model benefits universities and industries in other regions who seek to develop similar models.

Instructional materials developed from this project are being disseminated to other institutions and industry through computer links by means of multimedia CD-ROMs. Every effort is being made to present results at conferences of various professional societies, as well as publications. The Task Force is also hosting a faculty enhancement workshop to disseminate initial results and to gather additional input after the first year of the project.

Title: Introductory Biology at Community Colleges: A New Model

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Biological Sciences Curriculum Study (BSCS)
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DUE 9455725
FY 1995 ATE $100,000
(TOTAL $ 450,000)
FY 1996 ATE $50,000
(TOTAL $ 435,000)
FY 1997 ATE $50,000
(TOTAL $ 435,000)
Course and Curriculum
Life Sciences

In recognition of the importance of introductory biology courses at community colleges to the education of the future workforce and the development of scientific literacy, BSCS is conceptualizing, writing, testing, and evaluating a set of innovative curriculum materials for biology students at the college level. Collaborating in the 36-month project are 15 partners, including biology faculty at 8 community colleges (involving several that offer programs in biotechnology and environmental technology that include strong components of basic science), the American Association of Community Colleges (AACC), the two-year college section of the National Association of Biology Teachers (NABT), the Society for College Science Teaching (SCST), the American Mathematical Association of Two-Year Colleges (AMATYC), the American Institute of Biological Sciences (AIBS), Ward's Natural Science Establishment, Inc., and Kendall/Hunt Publishing Company (college division). The completed program is offering an integrated and coherent approach to helping students achieve three major goals of biological literacy: (1) to understand the basic unifying principles of biology; (2) to develop the fundamental skills of critical thinking and scientific reasoning; and (3) to recognize the applications of science, especially relationships among science, technology, and society. The materials that are being developed are of use to future teachers of science at the elementary and secondary levels because strategies are incorporated that encourage students to reflect on the overall design of the program, the strategies that help them learn, various teaching techniques, and assessment strategies. The products of the project include student materials (readings, activities, and laboratory exercises) that support both semester- and year-long introductory biology courses and that emphasize hands-on, open-ended inquiry, collaborative learning, and the relationships among science, technology, and society; an Instructor's guide that provides faculty with extensive background reading and specific implementation support; and a model for a faculty development workshop that is being designed and tested by the partner faculty and is being supported after the end of the project by revenues realized from sales of the program.

Title: Activity-Based Physics: Curricula, Computer Tools, and Apparatus for Introductory Physics Courses

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DUE 9455561
FY 1995 ATE $100,000
(TOTAL $725,000)
(FY 1996 $ 525,000)
(FY 1997 $ 525,000)
Course and Curriculum
Physics

Three related activity-based introductory physics curricula have been developed with major support from the U.S. Department of Education and the National Science Foundation. These are Workshop Physics, Tools for Scientific Thinking, and RealTime Physics. All three curricula use the findings of physics education research; are activity-based; and involve the design of computer hardware and software for investigation, data analysis, and dynamic modeling. This 3-year collaboration between principal investigators at Dickinson College, University of Maryland, University of Oregon, Tufts University, and Millersville State University is extending, enhancing, evaluating, and disseminating activity-based curricular materials, apparatus, and computer tools for teaching introductory physics based on this previous work. The ultimate goals of this program are to continue full scale efforts to improve the scientific literacy of introductory physics students through the mastery of physics concepts, investigative skills, and mathematical modeling techniques and to motivate students to learn more science. Throughout the 3-year period, a comprehensive dissemination program is being conducted to reach introductory physics instructors at high school and college levels through workshops, public talks, on-site visits to institutions, and journal publications. These dissemination efforts are being supported by the commercial distribution of products through J.C. Wiley & Sons, PASCO Scientific, Vernier Software, and Physics Academic Software. Particular attention is being given to developing physics activities suitable for courses designed for future technicians at two year colleges and preservice teachers.

Instrumentation and Laboratory Improvement - FY 1995 Awards For Two- Year Colleges

In 1995, many projects were supported through the Instrumentation and Laboratory Improvement (ILI) program with an emphasis on advanced technological education. They are included in this book to show the breadth of support for technical education. Instrumentation only projects for technician education are supported primarily through ILI, not ATE.

Title: New Laboratory Experiments in Analog Electronics Course Using Microcomputer Based Instrumentation and LabVIEW

Rajappa Papannareddy
Purdue University North Central
1401 South US 421
Westville, IN 46391

DUE 9550836
FY 1995 $ 26,090
Instrumentation and Laboratory Improvement
Electronics

This project is providing new improved laboratory experiments pertaining to analog electronics courses in a 2-year electrical engineering technology program. Experiments related to temperature effects, nonlinear systems, advanced devices and circuits, and noise effects are being conducted using the microcomputer-based workstation and LabVIEW. The project involves developing new test methods or virtual instruments to characterize the new laboratory experiments. The workstations can also be utilized for other laboratory experiments related to circuit and analog electronics courses in electrical engineering technology and sophomore engineering curricula. In this project, the student's learning behavior and understanding of the concepts related to proposed experiments are also studied. A survey of questions is being devised to get the feedback from students regarding the usage of new laboratory equipment and LabVIEW.

Title: Instrumentation to Apply the Scientific Method in Undergraduate Environmental Science Laboratories

James A. Collier
Truckee Meadows Community College
7000 Dandini Boulevard
Reno, NV 89512

DUE 9550931
FY 1995 $20,893
Instrumentation and Laboratory Improvement
Environmental Technology

This project enables faculty to design laboratories in an introductory environmental science class that raise the scientific literacy of students with little or no scientific background through applying the pedagogy of learning. New equipment supports the creation of four laboratory exercises. These exercises are designed so that students apply the scientific method using recently developed data collection technology and computer software. The laboratory exercise sequence starts students at a relatively low conceptual level at which learning occurs through manipulating physical objects to observe cause and effect relationships. It concludes with a sampling exercise that involves students with a more intellectually sophisticated level of conceptual and analytical thought. The emphasis placed on intellectual development in this series of laboratory exercises is unique and highly useful in developing scientific literacy. The new equipment introduces scientifically illiterate students to: (1) cause and effect relationships in science through the use of a ground water model and computer simulations that allow students to manipulate variables and watch the results; (2) methods of collecting and analyzing data that range from qualitative observations to the use of state-of-the-art environmental sensors and computers; and (3) effective communication of their discoveries and excitement in a written and mathematical form.

Title: Rapid Prototyping in Draft and Design Technology

Steven E. Wendel
Sinclair Community College
444 West Third Street
Dayton, OH 45402

DUE 9550953
FY 1995 $70,316
Instrumentation and Laboratory Improvement
Manufacturing Technology

The Drafting and Design Department is incorporating rapid prototyping as a key element in the revision of the curriculum. Objectives of this project are: (1) to modernize the drafting and design technology curricula by providing the required rapid prototyping laboratory equipment; (2) to establish a rapid prototyping laboratory for hands-on learning concordant with curriculum development recommendations for associate degree engineering technology courses; (3) to implement distance learning technologies for cost-effective rapid prototyping laboratory access by other 2-year associate degree programs; (4) to offer rapid prototyping laboratory access to a regional consortium; and (5) to provide rapid prototyping laboratory access for the project to implement, integrate, and pilot implement a national model for manufacturing education. The current basis for design representation is the

solid geometric model. New program outcomes are being enhanced by providing students with the opportunity to take the next logical step (i.e., from a solid geometric model, seamlessly and quickly, to an actual prototype of the part to be manufactured). Students acquire additional knowledge and skills at the design-production interface, the type of concurrent engineering that is becoming commonplace in heavily technological advanced manufacturing operations.

Title: Automated/Instrumentated Open Channel Hydraulics Laboratory

Marshall R. Boggio
Ocean County College
Department of Engineering
College Drive, P.O. Box 2001
Toms River, NJ 08753

DUE 9551137
FY 1995 $38,500
Instrumentation and
Laboratory Improvement
Civil Engineering
Technology

The focus of the project is on that area of hydraulics dealing with phenomena of open channel flow. Recent natural disasters, such as the Mississippi basin flooding, demonstrate that a greater awareness of the forces of nature and the principles of open channel flow are needed in our society to plan and develop better infrastructures. This project integrates physical laboratory experimentation in hydraulics and data acquisition techniques with engineering calculations to facilitate the graphical/pictorial and animation power of the computer to create an integrated multivisual presentation. The laboratory setting, part of the Civil Engineering Technology and Environmental Studies program at the colleges, is analogous to a modern day process control room with multiple displays providing student groups with the capability for interactive learning. Students receive different perspectives of data, relevant equations, experimental dynamics, visual animation, and actual real-world photos/videos of the phenomena under study. System integration requires the utilization of an open channel testing flume structure; computer hardware and software; optical discs; and software (media) production processes to develop a coherent story-line and interactive presentation of the experiment for on-line student understanding. As part of this project, students are being exposed to problems of environmentally related channel flow as experienced in the area. Project outcomes are suitable for demonstrations to K-12 secondary public school students to motivate interest in science and technology.

Title: Modular Chemistry Laboratory for Community College Students

Mary J. Abraham
Western Iowa Technical
Community College
Department of Chemistry
4647 Stone Avenue
P.O. Box 265
Sioux City, IA 51102

DUE 9551243
FY 1995 $ 16,659
Chemistry
Instrumentation and
Laboratory Improvement

An FT-IR, gas chromatograph, and supporting computers and computer software are being used in a modular course in instrumental analysis. The course is being offered in three modules of 5 weeks each to non-science majors, electronic engineering technology students, and internationally educated students who have had little opportunity to use laboratory equipment. High school students as well as technicians working in local industries have opportunities to learn to use the equipment as well. The project is having a significant impact on undergraduate students by providing access to science within a positive, non-intimidating environment. The challenge is to provide learning experiences and curricular content that are relevant, learner-friendly, interesting, and exciting, and which stimulate the interest of non-science students to enroll in subsequent science courses. A pre and post survey is being given to assess the student interest/knowledge in science. The impact of the project is being disseminated to regional and national American Chemical Society and science education conferences.

Title: Instrumentation Laboratory for the Electro-Mechanical Engineering Technology Program

Shahriar Jahanian
Pennsylvania State University
-Altoona
3000 Ivyside Park
Altoona, PA 16603

DUE 9551289
FY 1995 $36,893
Instrumentation and
Laboratory Improvement
Electro-Mechanical

This project provides support facilities for an interdisciplinary instrumentation and measurement course in a newly designed degree in Electro-Mechanical Engineering Technology program. Transducers and sensors that are highly interdisciplinary are being introduced. Laboratory experiences of this nature greatly assist students in becoming familiar with numerous types of transducers, data acquisition, principles of data communication, as

well as advanced graphical engineering software. Specifically this project: (1) introduces both digital and analog instrumentation and measurement to students; (2) allows students to acquire data from transducers in an automated fashion; (3) allows students to use their acquired data for further mathematical and graphical analysis; and (4) introduces the principle of local networking to the students and provides a vehicle for training hands on. The experiments in this laboratory are designed to be flexible in order to permit modification and to allow the students to experience interdisciplinary work exercises. The data acquisition, data communication, and post-data-acquisition parts permit the students to become familiar with the theoretical aspects of experiments.

Title: Implementation of Biotechnology in Majors Biology

Martin Ikkanda
Los Angeles Pierce College
Department of Life Science
6210 Winnetka Avenue
Woodland Hills, CA 91371

DUE 9551346
FY 1995 $12,686
Instrumentation and
Laboratory Improvement
Biotechnology

The shortage of modern equipment at the college has prevented biology majors from exploring a significant area of molecular biology, DNA science in the laboratory. Although a good portion of the lecture is spent on cell molecular biology, many of these topics remain abstract and esoteric since students have been unable to perform experiments in the laboratory. This project, involving a 2-year community college, a 4-year university, and private industry, establishes a biotechnology consortium to prepare laboratory investigations that give students hands-on experience with fundamental techniques used in biotechnology. These experiments parallel topics discussed in lectures. The investigations involve: (1) an introduction to DNA science; (2) DNA restriction analysis; and (3) recombinant DNA technology. Individuals primarily affected are biology majors and those preparing for careers in medicine, biological research, and teaching. About 200 students per year will use the equipment and protocols of this project. The laboratory investigations are initially being integrated into the major's biology course and microbiology. These experiments serve as a basis for expansion into a separate biotechnology course and provide the stimulus to initiate a tech-prep program. The new equipment is so fundamental to performing biotechnology protocols that it can provide the flexibility to allow expansion into these courses.

Title: Improvement of Undergraduate Education in Advanced CNC and CAD/CAM Technologies

Joan A. Stepsis
San Diego City College
Department of Applied
Competitive Technology
CACT-SDCC
1313 12th Avenue
San Diego, CA 92108

DUE 9551480
FY 1995 $27,485
Instrumentation and
Laboratory Improvement
Manufacturing Technology

San Diego City College has recently upgraded its science, engineering, and technology courses to offer students comprehensive associate degree and certificate programs in advanced machine tool and manufacturing technologies. Because defense industry downsizing is forcing manufacturing and machine tool firms into new markets (e.g., biomed, biotech, electronics), CNC operators and CAD/CAM technologists are needed who can use advanced technology to design and produce small, complex parts. To supply graduates for these jobs, the college is developing its undergraduate Machine Technology program into an Advanced CAD/CAM & CNC Technology curriculum. The college and an industry partner are funding new CAD/CAM software delivering advanced surface modeling capability to DOS and NT platforms; this project purchases machine tool components needed to add 4th and 5th axis movement to the College's 3-axis vertical machining center (VMC). Corresponding improvement of Introductory/Advanced CAD/CAM courses let students use the CAD/CAM software to model and verify advanced CNC surface programs. In improved Introductory/Advanced CNC Vertical Machining & EDM courses, students learn to set up and operate the 5-axis VMC needed to machine their programs. In a new 200 series, Advanced VMC, students use the software and 5-axis VMC to design and execute sophisticated surface models for applied research and industry applications.

Title: BHCC Computer Network Program: Upgrading Microcomputer Technician Skills with a Dedicated Novell Lab

Judith C. Oleks
Bunker Hill Community College
Department of Computer Technology
250 New Rutherford Avenue
RM D206E
Boston, MA 02129

DUE 9551649
FY 1995 $33,175
Instrumentation and Laboratory Improvement
Computer Technology

Through this project, the Computer Technology Department is establishing a Novell network system which is currently the industry standard. The network resembles a real-world local area network, consisting of 18 IBM PCs and 3 Power MAC workstations as well as several printers. The laboratory supports four core courses in a new 1-year certificate program: Introduction to Networks, Network Administration, Advanced Network Administration, and Fundamentals of Internet Work. The college also offers a 62-credit associate degree program in Computer Networks. Eligible students include currently employed computer operators requiring training for career advancement, high school graduates, and clients under the Job Training Partnership Act. Information about the project and its outcomes are being widely shared through the American Association of Community Colleges, the New England Board of Higher Education, Internet, and a summer Tech-Prep institute for high school teachers.

Title: The Western Piedmont Community College Computer Enhanced Mathematics Instruction Project

Odell Witherspoon
Western Piedmont Community College
Department of Mathematics
1001 Burkemont Avenue
Morganton, NC 28655-4504

DUE 9551705
FY 1995 ATE $ 13,700
(TOTAL $38,700)
Instrumentation and Laboratory Improvement
Mathematics

The Mathematics Department at Western Piedmont Community College requires extensive use of calculators in all mathematics courses. College algebra students and calculus students are required to have graphing calculators while other students are required to have scientific calculators with linear regression capability. The integration of computer usage into the mathematics curriculum is the next logical step in the evolution of the College's mathematics program. To achieve this goal, the Western Piedmont Community College Computer Enhanced Mathematics Instruction Project (CEMIP) is enabling the department to equip a multipurpose instructional computer laboratory by providing matching funds for the purchase of 21 microcomputers, 4 printers, a VGA liquid display panel with an overhead projector, and site licenses for 3 commercial software packages: DERIVE, MAPLE, and MINITAB. The lab is used as a teaching classroom, an assigned computer usage lab, and a limited-access lab open for selected mathematics students. Initially, the project concentrates on incorporating computer usage into calculus and statistics instruction, with the ultimate goal of having computer usage integrated into the entire mathematics curriculum including those classes taken by students studying in technology programs.

Title: Developing a Micropropagation Training Lab

Charles B. Tarrants
SUNY College of Technology
Department of Plant Sciences
155 Farnsworth Hall
Delhi, NY 13753-1190

DUE 9551715
FY 1995 $32,644
Instrumentation and Laboratory Improvement
Biotechnology

This project is establishing a Micropropagation Laboratory for training future horticulture technicians. As micropropagation is an asexual method of producing large quantities of genetically identical plants, the lab is a practical application of the concept of Toti potency (i.e., each somatic plant cell contains all necessary information to create an entire new plant). It is technologically intensive, and until recently was not practical on a large commercial scale. Current advances are allowing the process to see ever greater use in the horticulture industry. Yet the supply of technicians trained in this technique are not adequate for the industry's demand. A curriculum providing systematic training in techniques currently used by industry is being developed to help introduce new innovations from research institutions. Providing such a curriculum is an innovation for the industry. Micropropagation requires a sterile and carefully controlled environment. Students must learn the more rigorous demands of working with plants in such an environment. This project provides the equipment needed to train horticulture students in the micropropagation of a selected assortment of herbaceous and woody plants. The laboratory equipment also serves as the foundation of an expanded horticulture curriculum, offering an option concentrating on micropropagation techniques.

Title: Curriculum Enhancement Through Atomic Absorption Spectroscopy

Michael G. Burke
North Dakota State College of Science
Department of Science and Mathematics
800 North Sixth Street
Wahpeton, ND 58875

DUE 9551808
FY 1995 ATE $ 17,700
(TOTAL $35,655)
Instrumentation and Laboratory Improvement
Chemical Technology

The college is establishing a series of science intensive curricula aimed at students with an interest in science or engineering. The curricula are designed to facilitate students entering the workforce as skilled technicians after 2 years of postsecondary education and an industrial internship. Alternatively, students can continue on to complete their baccalaureate degree. This grant is aiding in the implementation of a Chemical Technology curriculum, while enriching chemistry laboratory courses for both vocational and transfer students. The college is acquiring an Atomic Absorption Spectrophotometer to complete the inventory for the Chemical Technology curriculum. Chemical technicians graduating from the college master the operation of the following instruments: FT-IR spectrophotometer, gas chromatograph, atomic absorption spectrophotometer, high performance liquid chromatograph, uv/vis spectrophotometer, electrophoretic apparatus, ISE meters, and general laboratory apparatus like balances, ovens, and incubators.

Title: Enhancing Physical Science Curricula Through Computer-Assisted Instruction and Data Image Processing

Gustavo Morales
Valencia Community College
Department of Science and Technology
Orlando, FL 32802

DUE 9552234
FY 1995 $ 20,327
Instrumentation and Laboratory Improvement
Interdisciplinary

Valencia Community College has a long history of providing a wide selection of comprehensive and high-quality academic programs designed to prepare students to meet changing workforce requirements. The College currently faces the challenge of continuing to fulfill this mission by incorporating appropriate technology into education and training programs for a student body that has become increasingly diverse. This challenge is perhaps greatest in the sciences. Through this project, Valencia is targeting six courses in the physical sciences by infusing computer-assisted learning experiences and data image processing into the curricula. In planning this project, faculty examined several possibilities for incorporating the use of computers into the laboratory setting for the following courses: Earth Sciences, Physical Geology, Historical Geology, Meteorology, Astronomy, and Oceanography. The project is based on the successful curricula developed by the Center for Image Processing in Education in association with the University of Arizona. Image processing provides a powerful medium to excite students about science, especially students from minority groups and others whose needs have not been met by traditional ways of teaching these subjects. Using professional-quality software on microcomputers, students explore a variety of scientific data sets, including earth remote sensing and meteorology data and planetary exploration images. While these courses develop inquiry and research skills for all students, the project encourages more students to pursue professional science and technology careers and provides them with the appropriate training in subject matter and the use of up-to-date technology for the respective fields.

Title: Laboratory Development For Microelectronics Technology

Jenna L. Ware
Texas State Technical Institute - Sweetwater
Department of Electronics
300 College Drive
Sweetwater, TX 79556

DUE 9552265
FY 1995 $59,602
Instrumentation and Laboratory Improvement
Electronics

This project enhances improvement of a semiconductor manufacturing laboratory that provides industry-specific microelectronics education for undergraduates. To this end, the Electronics Technology Department is obtaining three pieces of semiconductor wafer testing equipment and a vacuum leak detector. While geared in the main toward Electronics Technology students and Core Electronics students, the laboratory affords new capabilities for crossover electives and in-depth projects for students in advanced courses in Manufacturing Technology, Automation, Robotics, Telecommunications, Computer Maintenance, Drafting and Design, Information Processing, and Industrial Management. With high technology used to teach high technology, the semiconductor manufacturing lab emulates current trends in industry and provides students with the higher skill levels required for success in this increasingly complex field. The new equipment is programmable and process-critical which allows students to make wafer tests and measurements usually exclusively limited to small numbers of engineering students at 4-year degree schools. They produce, from the first wafer cleaning to the final electrical test, in real time in a controlled M 4.5 (Class 1000) environment, integrated circuits that differ from those produced in commercial labs only in their geometries.

Title: Math Projects - Interdisciplinary Education Applications Through Industry Partnerships And Industry-based Projects (MP-IDEA)

Peter Wildman
Casper College
Department of Mathematics
125 College Drive
Casper, WY 82601

DUE 9552273
FY 1995 $15,547
Instrumentation and Laboratory Improvement
Mathematics

MP-IDEA focuses on precalculus classes and is supported by industry partners and by an emerging network of regional colleges. MP-IDEA has 4 components to: (1) design precalculus courses that are relevant, that are realistic, and that give students skills and concepts to succeed in future math courses and in the workplace; (2) incorporate the intelligent use of modern technology into the math classroom, specifically, graphing calculators and computers; (3) incorporate alternative assessment practices in the mathematics classroom, specifically, the introduction of industry-based student research projects; and (4) incorporate cooperative learning techniques in the mathematics classroom, thus improving student attitudes, achievement, and interpersonal skills. This project improves mathematics instruction, implements six recommendations of the SCANS report, and serves as a regional model for improvement in postsecondary mathematics instruction. An exceptional element of MP-IDEA is educational partnerships with engineers and scientists at regional industries. These volunteers consult with MP-IDEA faculty to write industry-based math projects specific to the math that students in precalculus courses are learning. The math projects encourage cooperative learning, introduce students to modern technology, and provide a relevant means of assessing student learning.

Title: Infusing Technology into the Biology Majors Program

Charles Hoyt
Southwestern College
Department of Biology
900 Otay Lakes Road
Chula Vista, CA 91910

DUE 9552290
FY 1995 $38,570
Biotechnology

The faculty at Southwestern College have determined that the primary curricular improvements needed for the biology majors program are to provide computer experience in the laboratories, develop additional labs that require critical thinking in investigations using the scientific method, and provide students with biotechnology lab experience. Laboratory exercises in which the students formulate the experiments, and collect and analyze the data are being developed for the biology majors courses in zoology, cellular processes, and botany.

The equipment funded through this project includes: (1) 10 Macintosh PowerPCs, software for student use in collecting, analyzing, and manipulation data, and three printers for student use in the labs; (2) the MacLab system, an integrated data recording and analysis system that allows for the acquisition, display, analysis, and manipulation of physiological data; (3) computer-linked spectrophotometers and probeware for data collection of variables that change rapidly over time; and (4) biotechnology-related equipment, including pipetters, a centrifuge, an ultracold freezer, gel boxes, a transluminator, and a vacuum pump.

Title: A Fundamental Component of Engineering Technology

Gerald M. Garriot
Henry Ford Community College
5101 Evergreen Road
Dearborn, MI 48128

DUE 9552360
FY 1995 $64,089
Instrumentation and Laboratory Improvement
Electronics

To be successful in the electronics and robotics fields, students must understand the fundamental control devices used in modern industrial electrical systems. Through this project, a new industrial controls laboratory promotes curricular reform, allowing the presentation of concepts and applications in a setting more conducive to promoting "learning as an active process" as recommended by the National Science Educational Standards. Such a laboratory also directly responds to the needs of industrial clients who have participated actively in the redesign of the engineering technology program.

Title: Biotechnology Instrumentation and Laboratory Improvement: Purchase of an HPLC System for Biotechnology

James H. Tulloss
City Colleges of Chicago
Truman College
Department of Biology
1145 West Wilson Avenue
Chicago, IL 60640

DUE 9552375
FY 1995 $22,000
Instrumentation and Laboratory Improvement
Biotechnology

This project upgrades the status of the biotechnology laboratory in order to serve the specific training needs of the biotechnology private sector. Students graduating with a degree in biotechnology from the college are conducting analyses using the HPLC in the following areas of

biotechnology: (1) analysis, separation, and purification of polypeptides and oligonucleotides proteins including protein variants; (2) pharmaceutical compounds such as water soluble vitamins, anticonvulsants, antihistamines, cateholamines, antidepressants, and polyaromaic hydrocarbons; (3) compounds sometimes found in air, water, or other natural environments that need to be monitored to maintain a healthy environment; and (4) compounds found in the food industry.

Title: Metallographic Equipment for Manufacturing Processes and Materials Laboratory

Frank J. Rubino
Middlesex County College
Department of Mechanical/
Civil Engineering
155 Mill Road
Edison, NJ 08818

DUE 9552389
FY 1995 $20,080
Instrumentation and
Laboratory Improvement
Manufacturing

Microscopy equipment is being utilized within the manufacturing processes and materials laboratory, and laboratory projects are being developed for student use. The microscopy equipment that was used in the Materials Laboratory was limited to the extent that only one person could view the image at any given time. The instructor's ability to provide a meaningful answer to any questions the student asked about the structure was dependent upon the student's ability to describe what was seen. The new use of a video camera and console allows for a more positive identification of and discussion of the observed microstructure, since both student and instructor view the structure simultaneously. Other students benefit from the discussion of the microstructure in question, and all can see that structure. The imaging equipment is giving the student greater flexibility in obtaining photographic images for inclusion in laboratory reports. Using the video camera and digital printer allows making a hard copy without moving the specimen from one instrument to another. Since the digital images are less expensive as compared with the photographic methods currently used, time and money saved allow the individual student to make increased use of the microscopy equipment.

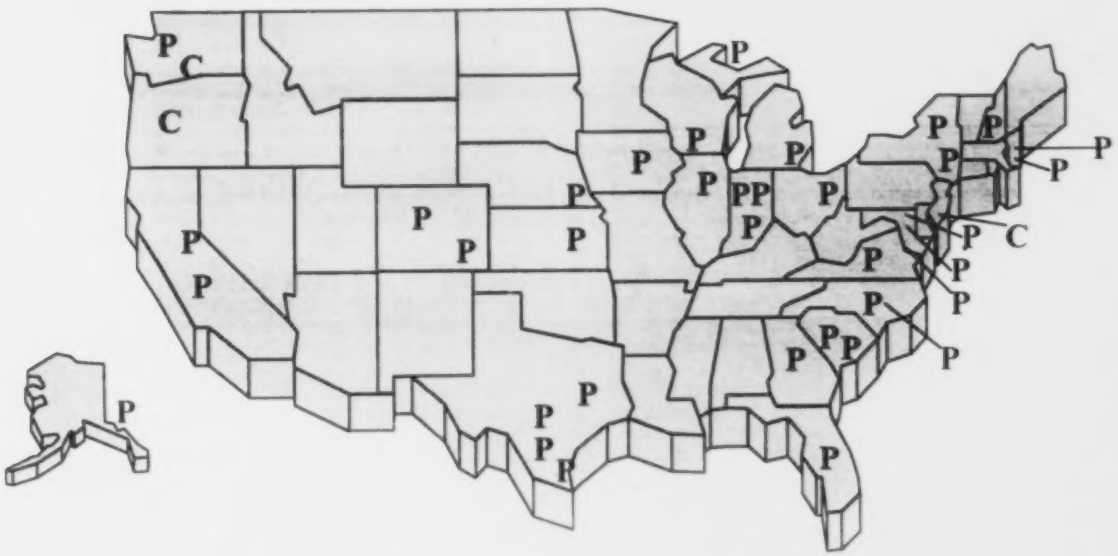
Title: Strain Gage Instrumentation for Analysis of Trusses and Other Mechanical Assemblies

Gregory Watkins
Central Piedmont
Community College
Department of Engineering
P.O. Box 35009
Charlotte, NC 28235

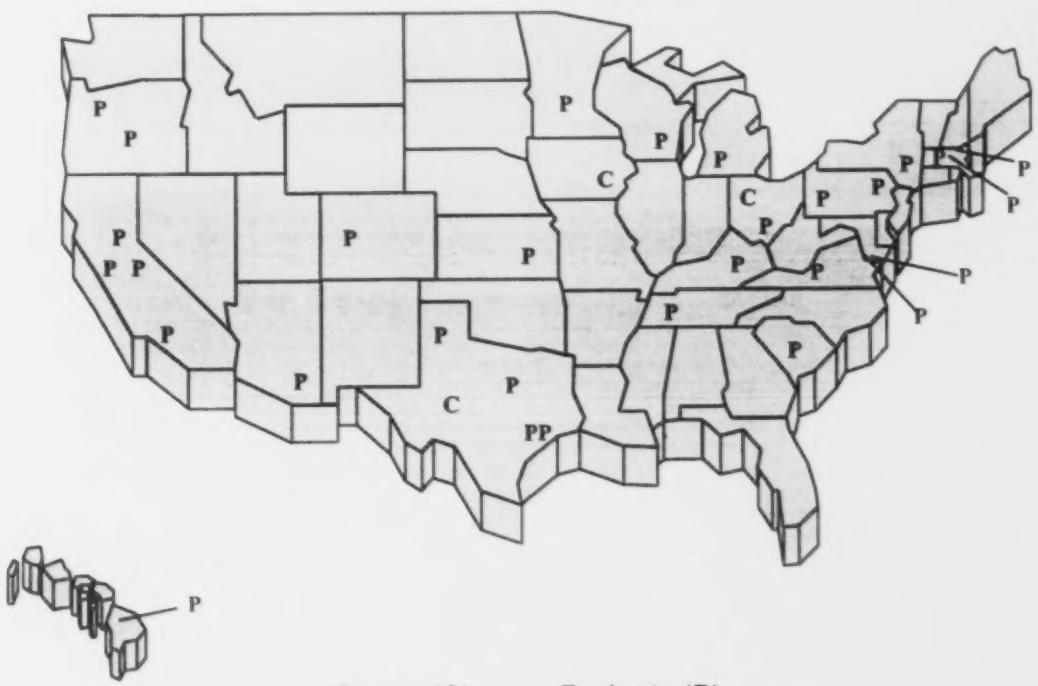
DUE 9552393
FY 1995 $8,053
Instrumentation and
Laboratory Improvement
Engineering Technology

In this project, students perform nondestructive laboratory work on truss assemblies and members of varying geometry to verify loads and deflections that were predicted by classroom problem solving. Implementation includes the construction of pin-connected truss models and machine components with varying geometry. These are instrumented with strain gages and appropriate readout equipment in order to demonstrate load sharing and distribution in trusses and the phenomena of stress concentration factors. The project permits the student to manipulate physical models in the laboratory to demonstrate topics that now rely solely on problem solving.

FY 1995 ATE Project and Center Awards



FY 1994 Continuing Awards



Center (C) Projects (P)

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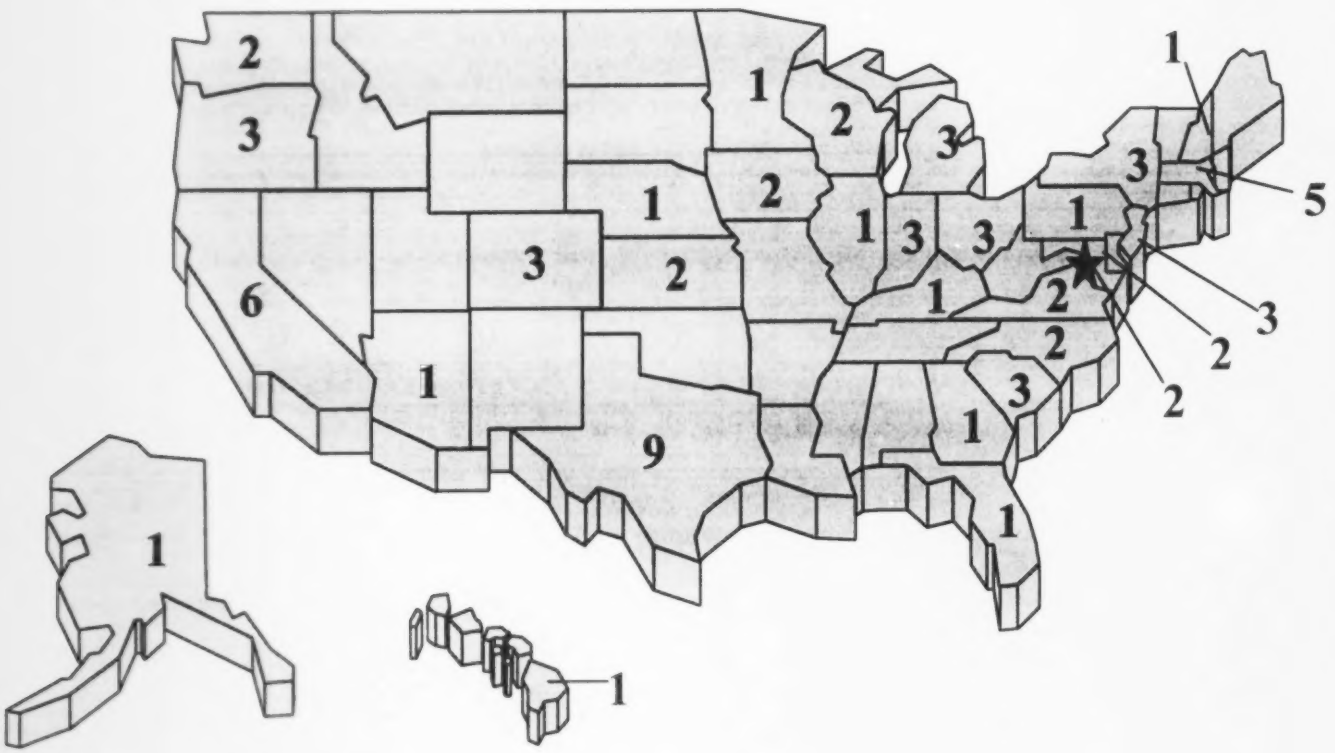
FY95 ATE Supported Projects: New and Continuing



Numbers shown represent total active awards in FY1995

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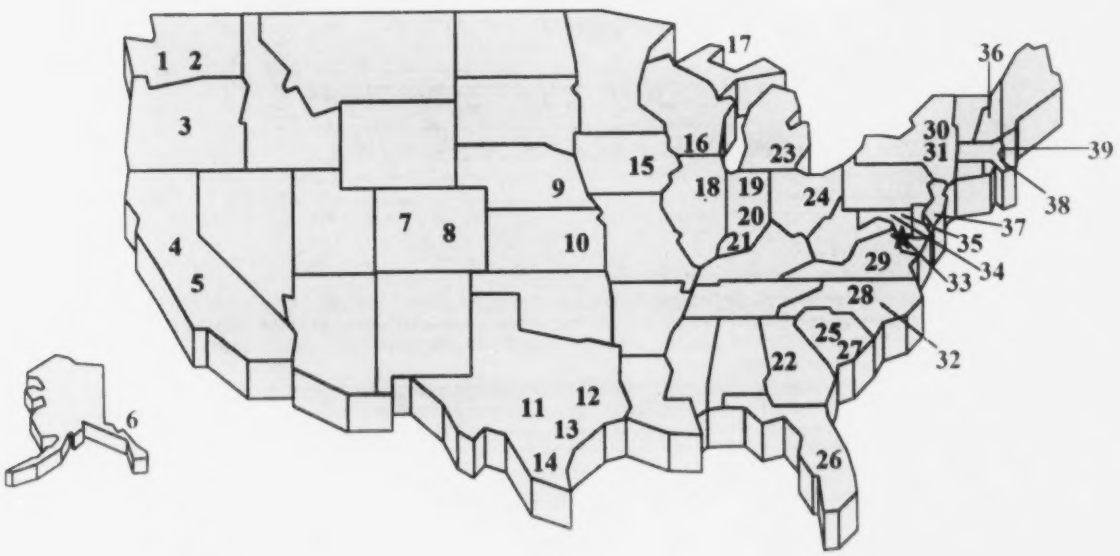
1995 ATE Awarded Institutions
115 Proposals received, 39 Awarded
36 Projects; *3 Centers



1. * Bellevue Community College, WA
2. North Seattle Community College, WA
3. * Chemeketa Community College, OR
4. De Anza College, CA
5. Los Rios Cmty. Col. System, CA
6. Univ. of Alaska SE Juneau, AK
7. CO Community College System, CO
8. Front Range Community College, CO
9. Southeast Community College, NE
10. Kansas St. University - Salina, KS
11. Austin Community College, TX
12. Rio Grande Center for Manu., TX
13. Texas St. Tech. Inst. - Waco, TX
14. Texas St. Tech. Inst. - Harlingen, TX
15. Hawkeye Community College, IA
16. Madison Area Tech. College, WI
17. Wayne St. Univ., MI
18. Northern Illinois Univ., IL
19. Indiana Univ. - Bloomington, IN
20. Rose - Hulman Inst. of Tech., IN
21. Indiana St. Univ., IN
22. Univ. of Georgia, GA
23. Michigan Tech. Univ., MI
24. Stark Tech. College, OH
25. Piedmont Tech. College, SC
26. Seminole Community College, FL
27. Trident Tech. College, SC
28. NC Board of Cmty. Colleges, NC
29. Nat. Assoc. of Bio. Teachers, VA
30. SUNY Adirondack Cmty. College, NY
31. CUNY/NYC Technical College, NY
32. Regional Tech. Strategies Inc., NC
33. Georgetown Univ., DC
34. Prince George's Cmty. College, MD
35. Johns Hopkins Univ., MD
36. Keene State Univ, NH
37. * Middlesex County College, NJ
38. Wentworth Institute of Tech., MA
39. New England Brd. of Higher Ed., MA

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Index of Awards By State
FY 1995 Standard and Continuing ATE Awards

DIVISION OF UNDERGRADUATE EDUCATION
and
The DIVISION OF ELEMENTARY, SECONDARY, and INFORMAL EDUCATION

Key: **ATE** = Advanced Technological Education, **ILI** = Instrumentation and Laboratory Improvement, **CCD** = Course and Curriculum Development, **DUE** = Division of Undergraduate Education, **ESIE** = Division of Elementary, Secondary, and Informal Education.

ALASKA

Title: Rural Alaskan Environmental Education Program
Gary L. Bowen
University of Alaska SE Juneau
1322 Seward Avenue
Juneau, AK 99801

ATE Project
DUE 9553680
FY 1995 $ 250,000
FY 1996 $ 250,000
FY 1997 $ 100,000
Environmental Technology

ARIZONA

Title: Image Processing for Teaching: Faculty Development and Curriculum Materials
Melanie Magisos
Center for Image Processing in Education
5343 E. Pima Street, Suite 201
Tucson, AZ 85712

ATE Project
DUE 9454520
FY 1994 $403,814
FY 1995 $466,493
FY 1996 $476,524
Computer Information Technology

CALIFORNIA

Title: Introduction to Molecular Biology and Molecular Diagnostics: Continuing Education for Community College Science Faculty
George E. Bruening
University of California
Department of Plant Pathology
349 Hutchison Hall
Davis, CA 95616

CCD Project
DUE 9455068
FY 1995 ATE $ 100,000 (TOTAL $ 450,000)
Life Science Biological

Title: Infusing Technology into the Biology Majors Program
Charles Hoyt
Southwestern College
Department of Biology
900 Otay Lakes Road
Chula Vista, CA 91910

ILI Project
DUE 9552290
FY 1995 $38,570
Biotechnology

Title: Sweeping Change in Manageable Units: A Modular Approach for Chemistry Curriculum Reform

C. Bradley Moore
University of California-Berkeley
School of Chemistry
Berkeley, CA 94720

Chemistry Initiative
DUE 9455924
FY 1995 ATE $100,000 (TOTAL$ 755,000)
FY 1996 ATE $50,000 (TOTAL $ 795,000)
FY 1997 ATE $50,000 (TOTAL $ 795,000)
(FY 1998 $ 350,000)
(FY 1999 $ 350,000)
Chemistry

Title: Advanced Biotechnology Education Project

Shahla Sheikholeslam
De Anza College
21250 Stevens Creek Boulevard
Cupertino, CA 95014

ATE Project
DUE 9553708
FY 1995 $ 225,306
Biotechnology

Title: Theme Curriculum: An Integrated Curriculum Development Project in Support of Advanced Technology Education

Dave Sinclair
Los Rios Community College System
Department of Design Technology
4700 College Oak Drive
Sacramento, CA 95825

ATE Project
DUE 9553717
FY 1995 $ 50,000
Computer and Information Technology

Title: Improvement of Undergraduate Education in Advanced CNC and CAD/CAM Technologies

Joan A. Stepsis
San Diego City College
Department of Applied Competitive Technology
CACT-SDCC, 1313 12th Avenue
San Diego, CA 92108

ILI Project
DUE 9551480
FY 1995 $27,485
Manufacturing

Title: Undergraduate Curriculum Development on Mechatronic Systems Engineering

Tai-Ran Hsu
San Jose State University Foundation
Department of Mechanical Engineering
One Washington Square
San Jose, CA 95106

CCD Project
DUE 9455395
FY 1995 ATE $20,000 (TOTAL $ 290,000)
(FY 1996 $ 113,280)
(FY 1997 $ 90,999)
Engineering

Title: Expanding the Biotechnology Education Program in the San Francisco/Oakland Bay Area

David R. Stronck
California State University Foundation
Department of Teacher Education
Hayward, CA 94542

ATE Project
DUE 9454502
$250,000
Biotechnology

Title: Preserving the Legacy: A Comprehensive Curriculum and Materials Development Project in Support of Advanced Environmental Technology Education

Sally V. Beaty
Intelecom Intelligent Telecommunications
150 East Colorado Boulevard, Suite 300
Pasadena, CA 91105

ATE Project
DUE 9454521
FY 1994 $ 499,988
FY 1995 $ 499,989
FY 1996 $ 499,989
Environmental Technology

Title: Advanced Technological Education in Biotechnology: A Community College Partnership with Industry
Barbara Des Rochers
Peralta Community College District Office
333 East Eighth Street
Oakland, CA 94606

ATE Project
DUE 9454657
FY 1995 $209,073
Biotechnology

Title: Pac-TEC: The Pacific Technological Education Center
Wade Ellis
West Valley Community College District
14000 Fruitvale Avenue
Saratoga, CA 95070

ATE Project
DUE 9454513
FY 1995 $300,000
Core and One or More Specific Technologies

Title: Implementation of Biotechnology in Majors Biology
Martin Ikkanda
Los Angeles Pierce College
Department of Life Science
6210 Winnetka Avenue
Woodland Hills, CA 91371

ILI Project
DUE 9551346
FY 1995 $12,686
Biotechnology

COLORADO

Title: Rocky Mountain Advanced Technology Education Project
Don E. Goodwin
Colorado Community College System
9125 East 10th Drive, Building 859
Aurora, CO 80010

ATE Project
DUE 9553706
FY 1995 $181,170
FY 1996 $117,294
Manufacturing

Title: Introductory Biology at Community Colleges: A New Model
Rodger W. Bybee
Biological Sciences Curriculum Study
Department of Biological Sciences
Pikes Peak Research Park
5415 Mark Dabling Boulevard
Colorado Springs, CO 80903

CCD Project
DUE 9455725
FY 1995 ATE $100,000 (TOTAL $ 450,000)
FY 1996 ATE $50,000 (TOTAL $ 435,000)
FY 1997 ATE $50,000 (TOTAL $ 435,000)
Life Sciences

Title: Electronics Technology Curriculum Development
Brenda L. Bryan
Front Range Community College
3645 West 112th Avenue
Westminster, CO 80030

ATE Project
DUE 9553685
FY 1995 $ 301,783
Electronics

Title: Environmental Technology Education Transfer to Native American Tribal Colleges
Karl F. Topper
Mesa State College
P.O. Box 2647
Grand Junction, CO 81502

ATE Project
DUE 9454633
FY 1994 $ 399,778
Environmental Technology

FLORIDA

Title: Introductory College Physics 2000 - ICP/2
Alexander K. Dickison
Seminole Community College
Highway 1792
Sanford, FL 32771

ATE Project
DUE 9553665
FY 1995 $ 429,521
Physics

Title: Enhancing Physical Science Curricula Through Computer-Assisted Instruction and Data Image Processing.
Gustavo Morales
Valencia Community College
Department of Science and Technology
Orlando, FL 32802

ILI Project
DUE 9552234
FY 1995 $ 20,327
Interdisciplinary

GEORGIA

Title: Using Multimedia Technology to Enhance Electronics Engineering Technology Programs
Dorothy J. Harnish
University of Georgia
104 Industrial Arts Building
Athens, GA 30602

ATE Project
DUE 9553676
FY 1995 $ 97,975
Engineering Technology

HAWAII

Title: Establishing and Transporting Science, Computer and Electronics Technology Curricula to Rural Minority Students through Simulated Labs and Telecourses
G. Robert Converse
University of Hawaii/Maui Community College
310 Kalahumanu Avenue
Honolulu, HI 96822

ATE Project
DUE 9454647
FY 1995 $499,938
Computer Information Technology

Title: West Hawaii Explorations Academy: A Center for Integrative Secondary Curriculum Development.
Bill Woerner
Hawaii Department of Education
P.O. Box 2360
Honolulu, HI 96804

ESIE Project
ESIE 9452790
FY 1995 ATE $75,000 (TOTAL $119,958)
FY 1996 ATE $75,000 (TOTAL $131,654)
FY 1997 ATE $75,000 (TOTAL $98,728)
Materials Development

ILLINOIS

Title: Biotechnology Instrumentation and Laboratory Improvement: Purchase of an HPLC System for Biotechnology
James H. Tulloss
City Colleges of Chicago Truman College
Department of Biology
1145 West Wilson Avenue
Chicago, IL 60640

ILI Project
DUE 9552375
FY 1995 $22,000
Biotechnology

Title: Development and Field Test of a Supplementary Welding Lab on Disk for Teachers and Students
Xueshu Song
Northern Illinois University
203 Still Hall
DeKalb, IL 60115

ATE Project
DUE 9553687
FY 1995 $ 213,851
Manufacturing

Title: Ethics and Biotechnology: A Blueprint for the Future
Catherine Propst
Northwestern University
Center for Biotechnology
2153 Sheridan Road, Hogan 1-195
Evanston, IL 60208

ATE Project
DUE 9554445
FY 1995 $69,980
Special Project

INDIANA

Title: Interdisciplinary Courses in Electronics Manufacturing
Elaine M. Cooney
Indiana University - Bloomington
799 West Michigan Street
Bloomington, IN 47402

ATE Project
DUE 9553699
FY 1995 $ 297,475
Electronics

Title: Advancing Geo-Technology Education: Providing GIS Remote Skills for the Workforce of the Twenty-First Century
William A. Dando
Indiana State University
217 North 6th Street
Terre Haute, IN 47809

ATE Project
DUE 9553694
FY 1995 $ 300,000
Geographical Information Systems

Title: Problem-Based Learning: A Key to Enhanced Performance in Advanced Technological Education
Buck F. Brown
Rose-Hulman Institute of Technology
Department of Electrical Engineering
5500 Wabash Avenue
Terre Haute, IN 47803

ATE Project
DUE 9553705
FY 1995 $ 475,000
Engineering Technology

Title: New Laboratory Experiments in Analog Electronics Course Using Microcomputer Based Instrumentation and LabVIEW
Rajappa Papannareddy
Purdue University North Central
101 South US 421
Westville, IN 46391

ILI Project
DUE 9550836
FY 1995 $ 26,090
Electronics

IOWA

Title: National Forum on Critical Issues in Environmental Technology Programs at Two-Year Colleges
Ellen Kabat
Eastern Iowa Community College District
500 Belmont Road
Bettendorf, IA 52722

ATE Project
DUE 9453181
FY 1995 $ 83,202
Special Projects

Title: Modular Chemistry Laboratory for Community College Students
Mary J. Abraham
Western Iowa Technical Community College
Department of Chemistry
4647 Stone Avenue
P.O. Box 265
Sioux City, IA 51102

ILI Project
DUE 9551243
FY 1995 $ 16,659
Chemistry

Title: Development of a Two-year Associate Degree in Agricultural Technology
Terry Brase
Hawkeye Community College
1501 East Orange Road
Waterloo, IA 50704

ATE Project
DUE 9553751
FY 1995 $ 200,000
Biotechnology

Title: ATEEC - Advanced Technological Environmental Education Center
Ellen Kabat
Eastern Iowa Community College District
500 Belmont Road
Betterdorf, IA 52722

ATE Center
DUE 9454638
ATE $999,961 (TOTAL $2,999,866)
Environmental Technology
FY 1994 $999,961
FY 1995 $999,907
FY 1996 $999,998

KANSAS

Title: A National Two-Year Associate Degree Program in Environmental Technology
Stephen E. Swanson
Kansas State University - Salina
2409 Scanlan Avenue
Salina, KS 67401

ATE Project
DUE 9553753
FY 1995 $75,000
Environmental Technology

Title: Two-Year Associate of Technology Curriculum Development for GIS/GPS Technologies
James L. Keating
Kansas State University - Salina
2409 Scanlan Avenue
Salina, KS 67401

ATE Project
DUE 9454618
FY 1994 $500,000
Geographical Information Systems

KENTUCKY

Title: Kentucky Advanced Technology Education Project.
Anthony Newberry
University of Kentucky Community College System
Breckinridge Hall
Lexington, KY 40506

ATE Project
DUE 9454585
FY 1994 ATE $696,300 (TOTAL $800,000)
Mathematics

MARYLAND

Title: The Two-Year College in the Twenty-First Century: Breaking Down Barriers
Mary Beth Monroe
American Association of Physics Teachers
5110 Roanoke Place, Suite 101
College Park, MD 20740

ATE Project
DUE 9450160
FY 1995$208,348
FY 1996 $358,975
FY 1997 $360,125
FY 1998 $257,957
Special Project

Title: Physics Education in the Two-Year Colleges: A Neglected Resource
Michael Neuchatz
American Institute of Physics
Education and Employment Statistic Division
One Physics Ellipse
College Park, MD 20740

ATE Project
DUE 9453180
FY 1995 $99,988
FY 1996 ATE $93,000 (TOTAL $193,000)
FY 1997 $92,692
Special Project

Title: Remote Sensing, Image Processing, and Geographic Information Systems
Patricia A. Cunniff
Prince George's Community College
301 Largo Road
Largo, MD 20772

ATE Project
DUE 9553662
FY 1995 $ 313,973
FY 1996 $ 293,427
FY 1997 $ 87,541
Geographical Information Systems

Title: Integrating Computer Software into Lower Division Engineering Technology Courses
William D. Lauffer
Prince George's Community College
301 Largo Road
Largo, MD 20772

ATE Project
DUE 9455105
FY 1995 $39,269
Engineering Technology

Title: Associate Degree for Manufacturing Technicians
Arnold H. Packer
Johns Hopkins University
Charles and 34th Street
Baltimore, MD 21218

ATE Project
DUE 9553664
FY 1995 $ 499,967
FY 1996 $ 400,000
FY 1997 $ 399,867
Manufacturing

MASSACHUSETTS

Title: Teacher/Faculty Enhancement, Curriculum Development and Laboratory Improvement for Fiber Optics Technology Education
Nicholas M. Massa
New England Board of Higher Education
45 Temple Place
Boston, Massachusetts 02111

ATE Project
DUE 9553762
FY 1995 $ 365,100
Electronics

Title: Mathematics for Technology - Laboratory Investigations
Gary M. Simundza
Wentworth Institute of Technology
550 Huntington Avenue
Boston, MA 02115

ATE Project
DUE 9455996
Planning Grant
FY 1995-$46,804
DUE 9553704
Implementation Award
FY 1995 $ 499,951
Mathematics

Title: BHCC Computer Network Program: Upgrading Microcomputer Technician Skills with a Dedicated Novell Lab
Judith C. Oleks
Bunker Hill Community College
Department of Computer Technology
250 New Rutherford Avenue, RM D206E
Boston, MA 02129

ILI Project
DUE 9551649
FY 1995 $33,175
Computer Technology

Title: Hands-On Physics: A New Conception of Physics
Robert Tinker
Concord Consortium
37 Thoreau Street
Concord, MA 01742

ATE Project
DUE 9454575
FY 1994 $432,743
Physics

Title: Advanced Biotechnology Education Project
Barry L. Werner
Middlesex Community College
Springs Road
Bedford, MA 01730

ATE Project
DUE 9454642
FY 1994 $ 347,978
FY 1995 $ 392,307
FY 1996 $ 392,109
Biotechnology

Title: Math/Science Enhanced Manufacturing Technology Training for Females and Minorities
James Amara
Minuteman Science and Technology High School
758 Marrett Road
Lexington, MA 02173

ATE Project
ESIE 9453921
ATE FY94 $185,700(ATE FY96 $170,370)
Manufacturing

Title: REU-Site for Biotechnology
Bruce Jackson
Massachusetts Bay Community College
50 Oakland Street
Wellesley, MA 02181

BIR 9424103
FY 1995 ATE $15,000 (TOTAL $ 55,796)
FY 1996 ATE $15,000 (TOTAL $ 60,296)
FY 1997 ATE $15,000 (TOTAL $ 60,296)
Biotechnology

MICHIGAN

Title: A Fundamental Component of Engineering Technology
Gerald M. Garriot
Henry Ford Community College
5101 Evergreen Road
Dearborn, MI 48128

ILI Project
DUE 9552360
FY 1995 $64,089
Electronics

Title: The Southeastern Michigan Alliance for Reinvestment in Technological Education (SMARTE) Project
Mulchand S. Rathod
Wayne State University
Department of Engineering Technology
Detroit, MI 48202

ATE Project
DUE 9553692
FY 1995 $ 149,900
Manufacturing

Title: Chemical Engineering Technology Advanced Process Operations Program
Edward R. Fisher
Michigan Technological University
Department of Chemical Engineering
1400 Townsend Drive
Houghton, MI 49931

ATE Project
DUE 9553671
FY 1995 $499,996
Chemical Technology

Title: A Revision of Technical Physics
Robert W. Eshelman
Henry Ford Community College
5101 Evergreen Road
Dearborn, MI 48128

ATE Project
DUE 9454620
FY 1994 $ 129,670
Physics

MINNESOTA

Title: Establishing New Technology Education and Rural Area Networks
Chandler H. Stevens
Minnesota Riverland Technical College (Austin Campus)
1900 NW Eighth Street
Austin, MN 55912

ATE Project
DUE 9454551
FY 1994 $271,802
FY 1995 $228,198
Computer Information Technology

NEBRASKA

Title: A Chemical Technology Curriculum and Materials Development Project
John V. Kenkel
Southeast Community College
8800 O Street
Lincoln, NE 68520

ATE Project
DUE 9553674
FY 1995 $ 191,590
Chemical Technology

NEVADA

Title: Instrumentation to Apply the Scientific Method in Undergraduate Environmental Science Laboratories
James A. Collier
Truckee Meadows Community College
7000 Dandini Boulevard
Reno, NV 89512

ILI Project
DUE 9550931
FY 1995 $20,893
Environmental Technology

NEW HAMPSHIRE

Title: Defining the Emerging Role of the Technologist in a Computer-Aided-Engineering Environment
Robert W. Simoneau
Keene State College
229 Main Street
Keene, NH 03435

ATE Project
DUE 9553767
FY 1995 $250,000
FY 1996 $150,000
FY 1997 $148,260
Manufacturing

NEW JERSEY

Title: New Jersey Center for Advanced Technological Education
John Bakum
Middlesex County College
155 Mill Road
Edison, NJ 08818

ATE Center
DUE 9553749
FY 1995 ATE $785,997(TOTAL $ 985,997)
FY 1996 $ 982,931
FY 1997 $ 997,544
Engineering Technology

Title: Metallographic Equipment for Manufacturing Processes and Materials Laboratory
Frank J. Rubino
Middlesex County College
Department of Mechanical/Civil Engineering
155 Mill Road
Edison, NJ 08818

ILI Project
DUE 9552389
FY 1995 $20,080
Manufacturing

Title: Automated/Instrumentated Open Channel Hydraulics Laboratory
Marshall R. Boggio
Ocean County College
Department of Engineering
College Drive, P.O. Box 2001
Toms River, NJ 08753

ILI Project
DUE 9551137
FY 1995 $38,500
Civil Engineering Technology

Title: Integrating Technical Applications into the Learning of Mathematics: A Collaborative Effort
Reginald K. Luke
Middlesex County College Mathematics
Department of Mathematics
155 Mill Road
Edison, NJ 08818

ATE Project
DUE 9454604
FY 1994 $169,813

NEW YORK

Title: College/Industry Telecommunications Education Partnership
Charles W. Merideth
CUNY/NYC Technical College
300 Jay Street
Brooklyn, NY 11201

ATE Project
DUE 9553738
FY 1995 $156,000
Engineering Technology

Title: Development and Implementation of Advanced Applied Technological Mathematics
Alfred Patrick
SUNY Adirondack Community College
Bay Road
Glens Falls, NY 12804

ATE Project
DUE 9553765
FY 1995 $ 184,880
FY 1997 $ 49,314
Mathematics

Title: A Workshop Chemistry Curriculum
David K. Gosser
CUNY City College
Department of Chemistry
Convent Avenue and 138th Street
New York, NY 10031

Chemistry Initiative
DUE 9455920
FY 1995 ATE $50,000 (TOTAL $ 425,000)
FY 1996 ATE $25,000 (TOTAL $ 400,000)
FY 1997 ATE $25,000 (TOTAL $ 400,000)
(FY 1998 $ 150,000)
(FY 1999 $ 150,000)
Chemistry

Title: Mathematics and its Applications in Engineering and Sciences: Building the Links
William E. Boyce
Rensselaer Polytechnic Institute
Department of Mathematics
110 8th Street
Troy, NY 12180

Mathematics Initiative
DUE 9552465
FY 1995 ATE $125,000 (TOTAL $1,311,000)
FY 1996 ATE $125,000 (TOTAL $ 700,000)
FY 1997 ATE $125,000 (TOTAL $ 700,000)
FY 1998 ATE $125,000 (FY 1998 $ 700,000)
(FY 1999 $ 600,000)
Mathematics

Title: Developing a Micropropagation Training Lab
Charles B. Tarrants
SUNY College of Technology
Department of Plant Sciences
155 Farnsworth Hall
Delhi, NY 13753

ILI Project
DUE 9551715
FY 1995 $32,644
Biotechnology

Title: Technology Instruction for the 21st Century
Bernard E. Mohr
CUNY Queensborough Community College
56th Avenue Springfield Boulevard
Bayside, NY 11364

ATE Project
DUE 9454613
FY 1994 $197,013
FY 1995 $205,300
FY 1996 $110,652
Electronics

NORTH CAROLINA

Title: Collaborative Model for Technician Education Through Interactive Technology
J. Parker Chesson
North Carolina State Board of Community Colleges
200 West Jones Street
Raleigh, NC 27603

ATE Project
DUE 9553709
FY 1995 $ 120,000
Manufacturing

Title: New Technologies, Techniques and Technical Skills in the Manufacturing Economy: Reinventing Community Colleges
Stuart A. Rosenfeld
Regional Technology Strategies, Inc.
Chapel Hill, NC 27514

ATE Project
DUE 9553698
FY 1995 $ 79,500
Manufacturing

Title: Strain Gage Instrumentation for Analysis of Trusses and Other Mechanical Assemblies
Gregory Watkins
Central Piedmont Community College
Department of Engineering
P.O. Box 35009
Charlotte, NC 28235

ILI Project
DUE 9552393
FY 1995 $8,053
Engineering Technology

Title: The Western Piedmont Community College Computer Enhanced Mathematics Instruction Project
Odell Witherspoon
Western Piedmont Community College
Department of Mathematics
1001 Burkemont Avenue
Morganton, NC 28655

ILI Project
DUE 9551705
FY 1995 ATE $13,700 (TOTAL $38,700)
Mathematics

NORTH DAKOTA

Title: Curriculum Enhancement Through Atomic Absorption Spectroscopy
Michael G. Burke
North Dakota State College of Science
Department of Science and Mathematics
800 North Sixth Street
Wahpeton, ND 58875

ILI Project
DUE 9551808
FY 1995 ATE $ 17,700 (TOTAL $35,655)
Chemical Technology

OHIO

Title: Partnership for the Advancement of Chemical Technology (PACT)
Arlyne M. Sarquis
Miami University Middletown
4200 East University Boulevard
Middletown, OH 45052

ATE Project
DUE 9454518
FY 1994 $ 400,000
FY 1995 $ 400,000
FY 1996 $ 400,000
Chemical Technology

Title: National Center of Excellence for Advanced Manufacturing Education (NCE/AME)
David T. Harrison
Sinclair Community College
444 West Third Street
Dayton, OH 45402

ATE Center
DUE 9454571
FY 1994 $ 1,000,000
FY 1995 $ 1,000,000
FY 1996 $ 1,000,000
Manufacturing

Title: Advanced Technological Education Project in Environmental Technology
Jeffrey Cramer
Stark Technical College
6200 Frank Avenue, NW
Canton, OH 44720

ATE Project
DUE 9553768
FY 1995 $516,209
Environmental Technology

Title: Rapid Prototyping in Draft and Design Technology
Steven E. Wendel
Sinclair Community College
444 West Third Street
Dayton, OH 45402

ILI Project
DUE 9550953
FY 1995 $70,316
Manufacturing Technology

Title: A National Workshop to Develop a National Agenda for the Future of Engineering Technology Education
George H. Sehi
Sinclair Community College
444 West Third Street
Dayton, OH 45402

ATE Project
DUE 9550659
FY 1995 $ 111,319
Special Project

OREGON

Title: Northwest Center for Sustainable Resources (A National Center for Advanced Technology)
Wynn W. Cudmore
Chemeketa Community College
4000 Lancaster Drive, NE, P.O. Box 14007
Salem, OR 97309

ATE Center
DUE 9553760
FY 1995 ATE $ 996,663 (TOTAL $ 999,663)
FY 1996 $999,553
FY 1997 $ 999,227
Environmental Technology

Title: The Application-Based, Technology-Supported One-Track Mathematics Curriculum Program (ATO)
Pamela E. Matthews
Mount Hood Community College
26000 SE Stark
Gresham, OR 97030

ATE Project
DUE 9454627
FY 1994 $469,923
Mathematics

Title: Advanced Technological Education Programs in Semiconductor Manufacturing
David Hata
Portland Community College
Department of Microelectronics Technology
P.O. Box 19000
Portland, OR 97219

ATE Project
DUE 9454589
FY 1994 $ 100,000
FY 1995 $ 100,000
Electronics

PENNSYLVANIA

Title: Instrumentation Laboratory for the Electro-Mechanical Engineering Technology Program
Shahriar Jahanian
Pennsylvania State University-Altoona
3000 Ivyside Park
Altoona, PA 16603

ILI Project
DUE 9551289
FY 1995 $36,893
Engineering

Title: Middle Atlantic Consortium for Mathematics and Its Applications Throughout the Curriculum
Dennis DeTurck
University of Pennsylvania
Department of Mathematics
Rittenhouse Laboratory
Philadelphia, Pennsylvania 19104

Mathematics Initiative
DUE 9552464
FY 1995 ATE $75,000 (TOTAL $598,206)
FY 1996 ATE $50,000 (FY 1997 $ 499,653)
FY 1998 $ 499,653
Mathematics

Title: Activity Based Physics: Curricula, Computer Tools, and Apparatus for Introductory Physics Courses
Priscilla W. Laws
Dickinson College
Department of Physics and Astronomy
Box 1773
Carlisle, PA 17013

CCD Project
DUE 9455561
FY 1995 ATE $100,000 (TOTAL $725,000)
(FY 1996 $ 525,000)
(FY 1997 $ 525,000)
Physics

Title: A Partnership for Excellence in Engineering Technology Education
Wayne R. Hager
Pennsylvania State University
School of Engineering Technology
245 Hammond Building
University Park, PA 16801

ATE Project
DUE 9454547
FY 1994 $ 282,000
FY 1995 $ 376,000
Manufacturing

SOUTH CAROLINA

Title: The South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty Project
Lynn Mack
Piedmont Technical College
Department of Mathematics
Greenwood, SC 29648

ATE Project
DUE 9553740
FY 1995 $ 486,930
FY 1996 $ 487,297
FY 1997 $ 482,379
Engineering Technology

Title: Integrating New Visions in Environmental Sciences Technology (INVEST)
Catherine Almquist
Trident Technical College
Department of Physical Sciences
P.O. Box 10367
Charleston, SC 29411

ATE Project
DUE 9553696
FY 1995 $250,647
Environmental Technology

Title: Establishment of an Instrumentation Calibration Laboratory
Ron Ingle
Piedmont Technical College
Emerald Road, Box 1467
Greenwood, SC 29646

ATE Project
DUE 9454536
FY 1994 $123,904
Engineering Technology

TENNESSEE

Title: Community College Science Connection Conference
Alfred Wohlpart
Oak Ridge Associated Universities
Science/Engineering Education Division
Oak Ridge, TN 37831

ATE Project
DUE 9552954
FY 1995 $ 40,000
Special Project

Title: Curriculum and Pedagogy Standards for Two-Year College and Lower Division Mathematics
Marilyn Mays
AMATYC
North Lake College
5001 North MacArthur Boulevard
Memphis, TN 38134

ATE Project
DUE 9443721
FY 1995 ATE $24,300 (TOTAL $ 34,300)
Special Project

TEXAS

Title: Foundation Skills for Advanced Technology
Stephen B. Rodi
Austin Community College
1212 Rio Grande Street
Austin, TX 78701

ATE Project
DUE 9553689
FY 1995 $ 318,715
Physics

Title: Regional Center of Excellence for Precision Manufacturing Technologies
Wayne Wells
Rio Grande Center for Manufacturing
Director's Office
1201 West University Drive
Edinburg, TX 78539

ATE Project
DUE 9553701
FY 1995 $100,340
Manufacturing

Title: Digital Imaging Laboratory Development Program
Bobby Hoyle
Texas State Technical Institute - Harlingen
Department of Information Management Technology
2424 Boxwood
Harlingen, TX 78550

ATE Project
DUE 9553741
FY 1995 $ 100,000
Engineering Technology

Title: Laboratory Development For Microelectronics Technology
Jenna L. Ware
Texas State Technical Institute - Sweetwater
Department of Electronics
300 College Drive
Sweetwater, TX 79556

ILI Project
DUE 9552265
FY 1995 $59,602
Electronics

Title: Machine Tool Advanced Skills Technology Educational Resources (MASTER) Program
John D. Pierson
Texas State Technical Institute - Waco
3801 Campus Drive
Waco, TX 76705

ATE Project
DUE 9553716
FY 1995 $ 550,000
FY 1996 $ 500,000
FY 1997 $ 500,000
Manufacturing

Title: Interactive Multimedia Instruction for Advanced Instrumentation Technology
Kenneth Sweeney
Alvin Community College
Department of Electronics
3110 Mustang Road
Alvin, TX 77511

ATE Project
DUE 9454508
$247,823
Chemical Technology

Title: Technical Sciences Academy Proposal
Therese A. Jones
Amarillo College
P.O. Box 447
Amarillo, TX 79178

ATE Project
DUE 9454651
FY 1994 $630,000
Core and One or More Specific Technologies

Title: Advanced Technical Education (ATE) Alliance
James A. Jordan
Consortium for Advanced Manufacturing International (CAM-I)
1250 E. Copeland Road, Suite 500
Arlington, TX 76011

ATE Project
DUE 9454655
FY 1994 $ 499,950
FY 1995 $ 499,950
FY 1996 $ 499,950
Manufacturing

Title: Young Scholars Program
Jerry J. Brand
University of Texas Austin
Botany Department
Austin, TX 78712

ESIE 9452693
FY 1995 $ 60,975
Young Scholars Program

Title: A Consortium for the Development of Advanced Manufacturing Education
Bartlett M. Sheinberg
Houston Community College
1550 Foxlake Drive, Suite 102A
Houston, TX 77270

ATE Project
DUE 9454569
FY 1994 $ 304,000
FY 1995 $ 300,000
Manufacturing

Title: Southwest Regional Center for Advanced Technological Education
Robert L. Musgrove
Texas State Technical Institute - Sweetwater
300 College Drive
Sweetwater, TX 79556

ATE Center
DUE 9454643
ATE $1,605,000 (TOTAL $1,711,637)
FY 1994 $565,872
ATE $465,872
ILI $100,000
FY 1995 $ 585,290
FY 1996 $560,475
Core and One or More Specific Technologies

VIRGINIA

Title: High Quality Biotechnology Education
Kathleen Frame
National Association of Biology Teachers
11250 Roger Bacon Drive
Reston, VA 22090

ATE Project
DUE 9553720
FY 1995 $ 499,239
Biotechnology

Title: A Model Rural Appalachian Partnership to Improve Technology Education through Faculty Enhancement and Curriculum Development Activities
Gary T. Laing
Wytheville Community College
1000 East Main Street
Wytheville, VA 24382

ATE Project
DUE 9454577
FY 1994 $197,873
Manufacturing

WASHINGTON, DC

Title: Preparation of Technicians for the Biotechnology Industry
Jack G. Chirikjian
Georgetown University
3900 Reservoir Road, NW
Washington, DC 20007

ATE Project
DUE 9553661
FY 1995 ATE $ 150,000 (TOTAL $ 250,000)
Biotechnology

Title: Faculty Development and Dissemination for ATE Program
Lynn Barnett
American Association of Community Colleges
One Dupont Circle, NW, Suite 410
Washington, DC 22036

ATE Project
DUE 9540310
FY 1995 $ 15,439
Special Project

Title: Expanding the Network of Community Colleges in Advanced Science and Engineering Technology Education
James Mahoney
American Association of Community Colleges
One Dupont Circle, NW, Suite 410
Washington, DC 20036

ATE Project
DUE 9552975
FY 1995 $237,320
Special Project

Title: Science Technology: Knowledge and Skills
David K. Lavallee
American Chemical Society (ACS)
1155 16th Street, NW
Washington, DC 20036

ATE Project
DUE 9454564
FY 1994 $ 500,000
FY 1995 $ 500,000
FY 1996 $ 500,000
Chemical Technology

WASHINGTON

Title: Northwest Center for Emerging Technologies: New Designs for Advanced Information Technology Education
Neil Evans
Bellevue Community College
3000 Landerholm Circle, SE
Bellevue, WA 98009

ATE Center
DUE 9553727
FY 1995 $999,737
FY 1996 $992,386
FY 1997 $999,931
Computer and Information Technology

Title: Advanced Technology Curriculum: Meeting AEA Standards
Andrew Woodson
North Seattle Community College
9600 College Way North
Seattle, WA 98103

ATE Project
DUE 9553726
FY 1995 $300,000
FY 1996 $300,000
Electronics

WISCONSIN

Title: ChemLinks Coalition: Making Chemical Connections
Brock Spencer
Beloit College
Chemistry Department
700 College Street
Beloit, WI 53511

Chemistry Initiative
DUE 9455918
FY 1995 ATE $100,000 (TOTAL $ 705,000)
FY 1996 ATE $50,000 (TOTAL $ 705,000)
FY 1997 ATE $50,000 (TOTAL $ 705,000)
(FY 1998 $ 350,000)
(FY 1999 $ 350,000)
Chemistry

Title: Advanced Dimensional Metrology and ISO 9001 Educational Partnership Program
Robert L. Brown
Madison Area Technical College
Department. of Engineering Technology
211 North Carroll Street
Madison, WI 53703

ATE Project
DUE 9553684
FY 1995 $ 155,036
Manufacturing

Title: An Advanced Biotechnology Education Partnership Program
Joy A. McMillan
Madison Area Technical College
Department of Biotechnology
3550 Anderson Street
Madison, WI 53704

ATE Project
DUE 9454555
FY 1994 $ 400,000
FY 1995 $ 400,000
FY 1996 $ 200,000
Biotechnology

Title: Establishing New Traditions: Revitalizing the Curriculum
John W. Moore
University of Wisconsin-Madison
Department of Chemistry
Madison, WI 53706

Chemistry Initiative
DUE 9455928
FY 1995 ATE $100,000 (TOTAL $849,968)
FY 1996 ATE $50,000 (TOTAL $849,999)
FY 1997 ATE $50,000 (TOTAL $849,941)
(FY 1998 $499,941)
(FY 1999 $499,742)
Chemistry

WYOMING

Title: Math Projects - Interdisciplinary Education Applications Through Industry Partnerships and Industry-based Projects (MP-IDEA)

Peter Wildman
Casper College
Department of Mathematics
125 College Drive
Casper, WY 82601

ILI Project
DUE 9552273
FY 1995 $15,547
Mathematics

Index of World Wide Web Pages
FY 1995 Standard and Continuing ATE Awards*

DIVISION OF UNDERGRADUATE EDUCATION

Title: Image Processing for Teaching: Faculty Development and Curriculum Materials DUE 9454520
http://ipt.lpl.arizona.edu/IPT/IPTcentral/

Title: Establishing New Technology Education and Rural Area Networks DUE 9454551
http://mn.co.net

Title: A Consortium for the Development of Advanced Manufacturing Education DUE 9454569
http://www.hccs.cc.tx.us/ame/ame.html

Title: Two-Year Associate of Technology Curriculum Development for GIS/GPS Technologies DUE 9454618
http://www.sal.ksu.edu

Title: ATEEC - Advanced Technological Environmental Education Center DUE 9454638
http://ateec.kirkwood.cc.ia.us/index.html

Title: Establishing and Transporting Science, Computer and Electronics Technology Curricula to Rural Minority Students through Simulated Labs and Telecourses DUE 9454647
http://www.maui.com/~mandrews/mccprojects/ate_proj.htm

Title: Associate Degree for Manufacturing Technicians DUE 9553664
http://www.jhu.edu:80/~ips/scans/article.html

Title: Machine Tool Advanced Skills Technology Educational Resources (MASTER) Program DUE 9553716
http://machinetool.tstc.edu/master/

Title: Northwest Center for Emerging Technologies: New Designs for Advanced Information Technology Education DUE 9553727
http://www.nwcet.ctc.edu/nwcet/

Title: The South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty Project DUE 9553740
http://mtc5.mid.tec.sc.us:8000/www/scate/scate.html

Title: Northwest Center for Sustainable Resources (A National Center for Advanced Technology) DUE 9553760
http://www.chemek.cc.or.us/ncsr

* Partial Listing Based on Information Available at Publication Time

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Barnett	Lynn	Project	43
Beaty	Sally V.	Project	35
Boggio	Marshall R.	Project	54
Bowen	Gary L.	Project	21
Boyce	William E.	Project	48
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Burke	Michael G.	Project	57
Bybee	Rodger W.	Project	52
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Chirikjian	Jack G.	Project	19
Collier	James A.	Project	53
Converse	G. Robert	Center	41
Cooney	Elaine M.	Project	25
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Cudmore	Wynn W.	Center	16
Cunniff	Patricia A.	Project	19
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Des Rochers	Barbara	Project	42
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Dickison	Alexander K.	Project	20
Ellis	Wade	Project	34
Eshelman	Robert W.	Project	39
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Garriot	Gerald M.	Project	58
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Gosser	David K.	Project	51
Hager	Wayne R.	Project	35
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Hsu	Tai-Ran	Project	51
Ikkanda	Martin	Project	55

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DIVISION OF UNDERGRADUATE EDUCATION
DIVISION OF ELEMENTARY, SECONDARY AND INFORMAL EDUCATION
ADVANCED TECHNOLOGICAL EDUCATION PROGRAM PERSONNEL
FOR FY 1995 [1]

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Tim Kashmer, Program Assistant, DUE
Melissa Lee, Senior Program Assistant, ESIE
Susan Leupold, Information Specialist, DUE*
Lori-Anne Mooney, Science Education Analyst, DUE
Philip Tavel, Science Education Analyst, DUE*

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[1] All individuals listed contributed to the FY 1995 Advanced Technological Education Program.

* These individuals contributed to the FY 1995 Program but are no longer at NSF.

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